

Fecal Incontinence in the Elderly: FAQ

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Fecal incontinence (FI) is a common gastrointestinal (GI) complaint in patients aged 65 years and older. This evidence-based review article discusses the epidemiology, pathophysiology, evaluation, and management of FI in the geriatric population. We emphasize aging-related changes leading to and impacting evaluation and treatment of this symptom while incorporating the core geriatric principles of functional status and management aligned with patient preference and goals of care.

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INTRODUCTION

This article is part of the on-going series, Frequently Asked Questions, with a focus on gastrointestinal (GI) conditions and diseases in the older adult. After a review of the magnitude of fecal incontinence (FI) in various care settings, the article focuses on changes in physiology and health in the older patient and how continence is affected. We consider the impact of common geriatric diseases that can impair continence and then guide the reader through an algorithm for evaluation. The article closes with medical, surgical, and behavioral techniques to treat FI, highlighting geriatric-specific data from published papers.

BRIEF REVIEW OF THE DEFINITION OF FI

FI is defined as the involuntary passage of stool or the inability to control stool from expulsion. The three types of incontinence include: urge incontinence, passive incontinence, and fecal seepage (1). *Urge incontinence*, when a patient has the desire to defecate but cannot make it to the toilet, is the loss of fecal matter despite active attempts to avoid defecation. *Passive incontinence* is the involuntary loss of gas or stool without awareness. *Fecal seepage* is the leakage of stool after a normal evacuation, usually presenting as staining of undergarments (2).

WHAT IS THE PREVALENCE AND ECONOMIC IMPACT OF FI IN THE ELDERLY?

FI is an under recognized problem in both the community dwelling and institutionalized persons. The prevalence and incidence of FI has been assessed in different settings: the community, nursing home, and hospital setting. Older estimates of FI ranged from 2 to 17% in the community setting (3,4). A more recent study of ambulatory health maintenance organization (HMO) patients has

indicated that the problem may affect more people than previously known with 36.2% of patients reporting FI. FI is more common in older patients. In a Medicare population, there was a 17% incidence rate of FI in a community dwelling population who was continent at baseline and followed for 4 years (5). Rey *et al.* (6) found a 7% incidence rate over 10 years in a community dwelling population over 50. Of 8,917 Canadian outpatient subjects, 4% of all patients reported FI—4.7% of all women and 3.0% of all men. There was an increase in the number of patients with FI across the three age groups studied (65–74, 75–84, 85+) ($P < 0.001$). This series also noted that patients with FI had a greater chance of institutionalization over the 4-year follow-up (odds ratio (OR) 1.79, $P < 0.05$) (7). A recent study using the NHANES cohort showed that age was independently associated with FI, after controlling for illness, activity level, and overall health (8).

In the nursing home setting, the rates of FI rise from 33 to 65%, depending on the series (5,9–13). In the hospitalized setting, there was a 16% prevalence of FI (51% of patients had FI < 1 week, 31% of patients had FI 1–3×/week, 12% of all patients had FI daily); however, only 3% of admitting physicians asked about FI (14). Age, stool form, and urgency seem to predict FI onset in hospitalized men while urinary incontinence and a prior forceps delivery were predictors in women (14).

FI has high direct and indirect costs associated with it. The adult diaper industry is a \$400 million industry (15). FI leads to institutionalization of elderly patients, with a \$1.5–1.7 billion cost. In the small HMO study (16), the authors noted greater number of outpatient and GI visits with a 55% increase in direct costs of health care for patients with FI.

FI has an increasing prevalence among older patients which is not explained by co-morbidity alone; this problem has a high economic burden to the health-care system and a review of this symptom should be included as part of an initial evaluation of an older patient.

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WHAT ANATOMIC AND PHYSIOLOGIC CHANGES RELATED TO DEFECATORY CONTROL CHANGE WITH AGING?

Defecation involves a complex series of events and factors including: diet, stool consistency, anorectal sensation, muscle strength and function as well as neurologic integrity, cognition, and motivation. The ability to control defecation can be divided into two components: continence and defecation. *Continence*, the ability to hold fecal material until volitional defecation, is under the control of both the autonomic and spinal cord nervous system. Control of fecal material involves the internal anal sphincter (IAS) which is under autonomic control and the external anal sphincter (EAS) which is innervated via the pudendal nerve from S2 to S4. Rectal compliance with appropriate accommodation allows for storage of fecal material. Rectal filling stimulates inhibitory motor neurons resulting in relaxation of the IAS. This is known as the recto-anal inhibitory reflex that permits sampling of rectal contents in the anal canal with the warning to defecate (17). If the anal canal sensation is intact, then the EAS and puborectalis muscles (PRMs) are voluntarily contracted to maintain continence. *Defecation*, or the evacuation of feces, occurs when one adopts a sitting position to allow relaxation of the PRM with straightening of the anorectal angle and as the IAS and EAS relax, the person bears down to expel feces.

Anatomical changes have been observed with aging. In a study of healthy older adults compared with younger adults, older subjects had thickened EAS and IAS (18) and a loss of the endovascular cushion (19). Fox *et al.* (20) studied 61 continent women and documented reduced anal resting and squeeze pressures, reduced rectal compliance, reduced rectal sensation, and perineal laxity with aging. A 30–40% decrease in sphincter pressure was seen in adults over 70 compared with those <30 years of age (21). Muscle fatigability of the EAS did not differ among younger and older patients for those with FI and those with severe constipation, showing less of an effect from age than from the underlying disease (22). Among a cohort of subjects with a mean age of 64, mean resting and squeeze pressure decreased with increasing age for men and women (23). Anal mucosal sensitivity and threshold to sense volume also increased with age in women (24). When comparing sex-related differences in anorectal physiology due to age, the confounding effect of obstetrical trauma must also be considered (see below) and may account for some of the differences.

Overall, age-related anatomic changes in the anorectal unit lead to decreased squeeze pressures that impair the neuromotor mechanisms of continence.

IN OLDER PATIENTS, WHAT RISK FACTORS ARE ASSOCIATED WITH FI?

There are specific epidemiologic risk factors in older patients that are associated with FI. In men, age over 85 years (OR 2.5), kidney disease (OR 1.9), and urinary incontinence (OR 2.3) were associated with FI (5,25). In a population-based study, white race, Geriatric Depression Score >5 (OR 3.2), urinary incontinence

(OR 2.0), and chronic diarrhea (OR 3.5) were associated with FI in women (5). Surprisingly, body mass index, age, constipation, education, and cognition (as scored by the Mini-Mental Status Exam) were not associated with incident FI in this cohort, suggesting a greater impact of chronic co-morbidity.

Patient reported symptoms obtained during the history or review of systems should prompt further questioning related to the complaint. In a 10-year follow-up study of community dwelling older adults, predictive risk factors for FI were self-reported onset of diarrhea (OR 3.8), incomplete evacuation (OR 3.4), pelvic radiation (OR 5.1), and development of fecal urgency (OR 24.9) (6). Symptoms predictive of FI included incomplete evacuation, anal blockage, and increased time to defecate (26).

Obstetrical trauma has been noted to be a risk factor for FI. The earliest reports date back to 1914, however, the mechanism was not known (27). There are two time periods where incontinence may be seen related to obstetric trauma: (i) immediately post-delivery and (ii) much later, often many years after. The former is probably due to direct damage to the neuromuscular mechanisms. For FI that develops later, one hypothesis proposed is that the pudendal nerve is stretched during childbirth leading to denervation of the anal sphincter muscles over time with FI developing later in life (28). Obstetric risk factors include history of heavy birth weight infants, forceps-assisted deliveries, and long second stage of labor. A few studies of women 10 years or more post-delivery do exist. Women who suffered a third-degree tear with primary repair were more likely than others to report FI and a decreased quality of life (29). Objective evidence of lower anal squeeze pressure in women with anal sphincter trauma during vaginal delivery was found after a decade of follow-up, leading to greater gas and stool incontinence (30). Since vaginal delivery may be more likely to cause pudendal nerve injury, it might be hypothesized that Cesarean section should be protective; however, a Cochrane systemic review did not find this to be the case (31).

A study of 2,640 women aged 50–61 years, one of the older cohorts published, showed FI was similar across modes of delivery; number of pregnancies; and spontaneous, instrumental, and Cesarean section delivery (32). Instead, self-reported depression, body mass index, surgery for urinary incontinence, and anal surgery were associated with development of FI. A recent case-control study of women (mean age 57–58 years) in Olmstead County shed new light on the influence of obstetrical trauma. The authors showed that body mass index, irritable bowel syndrome (IBS), diarrhea, rectocele, and stress incontinence, but not obstetrical trauma, were independently associated with FI. In women with these risk factors, obstetrical trauma increases the risk of development of FI, suggesting that it is a non-significant contributor in women with one or more of these other risk factors. The paper's conclusions suggesting that a clinician's initial workup for women who have had obstetrical trauma and FI should commence with examining for bowel disturbances rather than anatomic abnormalities through imaging (33).

Bowel symptoms and some medical co-morbidities, such as renal disease and depression, are emerging as important risk factors for the development of FI in older patients.

COGNITIVE AND NEUROLOGIC DISEASE IS MORE COMMON IN OLDER ADULTS. HOW DOES THIS IMPACT THE DEVELOPMENT OF FI?

The neurologic control of fecal continence involves the central nervous system (pre-frontal cortex and anterior cingulate gyrus), enteric neurons, and the autonomic nervous system (parasympathetic and sympathetic) (34,35). One pathophysiologic mechanism for the development of FI is when there is a defect in the sensory, motor, or central processing component of the neurologic mechanism of continence. Since FI can occur in states of diarrhea or constipation, diseases with neurologic underpinnings are important to consider. **Table 1** highlights common geriatric cognitive and neurologic diseases and their proposed mechanisms for the development of FI. Stroke (36), dementia, diabetes, and fecal impaction are most likely in the elderly to cause FI via a neurologic mechanism.

Clinicians need to be aware that vision, speech, and gait impairment from any cause can also impact control of continence in the elderly. Any deficit that impacts awareness of the need to defecate, ability to communicate for help with defecation, mobility, or self-care can worsen FI and lead to its consequences.

Formal gait assessment using a “Timed Get Up and Go” or Tinetti Gait and Balance Assessment (37,38) are standard tools to assess gait and mobility. Loss of any component of mobility can lead to onset or worsening of FI. In a community dwelling cohort of 4,277 older patients, mobility problems were associated with urinary incontinence and combined FI and urinary incontinence

(39). A nursing home randomized control trial of low impact exercise and incontinence care showed improved mobility endurance and decreased FI at the end of 8 months, suggesting a relationship between mobility and FI (40).

Clinicians should assess cognitive status, vision, and gait as part of an evaluation in an older patient with FI as these might be targets for a treatment plan.

WHAT SYSTEMIC DISORDERS ARE ASSOCIATED WITH FI AND ARE THERE SPECIAL CONSIDERATIONS IN THE OLDER PATIENT?

It has been well described that diabetes mellitus, multiple sclerosis (MS), scleroderma, and other systemic disorders can be associated with FI. There are no specific studies that address age differences in these populations but as treatments develop and life expectancy in these disorders improve, these issues will become more important and an opportunity for investigation. Diabetes mellitus occurs commonly in the older adult population, with 17% of new cases in those over 65, and the GI complications of diabetic autonomic neuropathy include constipation, diarrhea, and FI (41).

Diarrhea and FI occur in 22 and 20% of diabetics, respectively, and the onset of FI can be concurrent with diarrhea (42). A community survey of older patients reported FI prevalence of 13.2% in diabetic patients (43). Dietary changes in diabetes, including the use of sorbitol or other artificial sweeteners, can lead to looser stool

Table 1. Cognitive and neurologic diseases associated with fecal incontinence

Disease	Mechanism (if known)	Comments
Central nervous system		
<i>Dementia</i>	Impairs awareness of need to void loss of inhibitory control until voiding is appropriate impaired mobility	Manifestations depend on type of dementia
<i>Stroke</i>	Impaired awareness of rectal afferent input slowed motor processing communication barriers-aphasia/dysarthria frontal lobe damage	Depends on territory and size of infarct/hemorrhage (34)
Brain tumor	Similar to above	Dependent on location of tumor
Multiple sclerosis	Decreased external anal sphincter pressures decreased volumes of rectal distention to inhibit the internal anal sphincter (44)	
Peripheral nervous system		
Cauda equina syndrome	Compression of sacral nerves	
Polyneuropathies	Various mechanisms leading to destruction of the axon or myelin	Causes include infections, autoimmune disease, drugs
<i>Diabetes mellitus</i>	Neuropathy of both sensory and motor nerves internal anal sphincter dysfunction	
Shy-drager syndrome	Multisystem atrophy	
Toxic neuropathy	Destruction of nerve cells leading to loss of sensation or motor control	Drugs such as chemotherapy radiation
Traumatic neuropathy	Chronic straining during evacuation external anal sphincter weakness/pudendal nerve neuropathy	
<i>Fecal impaction</i>	Altered rectal sensation	
Most common causes listed in italics.		

consistency. This change in stool consistency coupled with sphincter dysfunction and rectal hyposensitivity as a result of diabetic neuropathy can predispose diabetics to FI (44,45).

In the older diabetic patient, FI can occur in the setting of reduced vision from retinopathy, complicated glycemic control characterized by hypoglycemia, and reduced mobility. Clinicians should screen these patients for FI and acting on modifiable factors could lead to an improved quality of life and prevent further downstream consequences of FI.

MS, a condition with increasing incidence in parts of the world, shares some of the pathophysiologic features of FI seen in diabetes. With newer treatments, MS patients are living longer. Caruana *et al.* showed that threshold volume for rectal sensation was higher in MS and diabetes mellitus compared with controls. Incontinent MS patients have decreased maximal anal sphincter pressures compared with patients with diabetes mellitus and healthy controls (46). Since patients with MS also experience other motor deficits leading to decreased mobility and urinary incontinence, FI can be an additional burden leading to skin breakdown and decreased quality of life. Similarly in scleroderma patients, there may be multifactorial reasons for FI including diarrhea from bacterial overgrowth or sphincter abnormalities. Magnetic resonance imaging has shown atrophy of the IAS and altered vascularity among incontinent patients with scleroderma (47).

Inflammatory conditions such as inflammatory bowel disease (IBD), radiation proctitis, or chronic rectal ischemia (48), characterized by inflammation and/or fibrosis, result in a decreased accommodative function of the rectum to serve as a reservoir. These are low compliance states and should be contrasted to high compliance states (see below). IBD-associated symptoms of urgency, diarrhea, and nocturnal symptoms can precipitate FI in the older patient with decreased mobility. In Crohn's disease, anorectal fistulae are another source of FI; new onset FI in these patients should prompt the clinician to evaluate for this manifestation of the disease. The presence of anorectal dysfunction and FI influence the surgical options for treatment of IBD, as pre-procedure incontinence or limited mobility may favor creation of a stoma rather than a primary anastomosis. For example, nocturnal (49,50) incontinence was reported by 44% of older patients who underwent ileal pouch anal anastomosis.

Physicians should be alert to coexisting medical problems that may have GI manifestations and investigate symptoms which might predict the onset of FI for patients and be targets for treatment.

WHAT IS THE ROLE OF DIARRHEA IN THE PRESENTATION OF FI IN THE OLDER ADULT?

Diarrhea, defined as frequent passage of loose stool, can lead to FI, especially in older adults with diminished sphincter function, altered sensation, mobility, or cognition. Acute and chronic diarrheal diseases are common in the elderly and may precipitate FI when the rectal capacity or weakened sphincter is overcome by urgency and loose or voluminous stool (48). A Veterans Affairs (VA) study of acutely ill patients found that 33% of patients had FI.

Increased age, illness severity, and liquid consistency of stool were risk factors for FI (51). As soon as a non-infectious cause is confirmed, antidiarrheal medication may be used to mitigate symptoms (48).

Embarrassment may lead incontinent patients to report diarrhea instead of FI, misleading the practitioner. Common non-infectious causes of acute and chronic diarrhea in the older adult include adverse effects of medications, tube feedings, celiac disease, microscopic colitis, ischemic colitis, radiation proctitis, hypersecretory tumors, and diabetic diarrhea. Chronic diarrhea in the older patient may be caused by small intestinal bacterial overgrowth and lactose (or other carbohydrate) intolerance (52,53). Older patients with chronic watery diarrhea may have microscopic colitis diagnosed on random biopsy of endoscopically normal colon mucosa (54).

Patients with FI may inaccurately report diarrhea as the presenting problem. Conversely, diarrhea can be mislabeled as primary FI; in some cases, diarrhea may result in FI.

CONSTIPATION IS A COMMON PROBLEM IN THE ELDERLY. HOW DOES CONSTIPATION AND CONSTIPATION WITH FECAL IMPACTION AFFECT FI?

Chronic constipation occurs frequently in the older adult and is reported in up to 27% of the population over 65 years of age (55). The multiple factors leading to constipation in the elderly include a sedentary lifestyle, decreased dietary fiber, metabolic disorders, medications that decrease GI motility and neurological diseases such as Parkinson's disease. More than 80% of nursing home patients had <3 bowel movements per week and 71% of them had FI, which was exacerbated by the use of stool softeners and laxative treatment for constipation (56).

High compliance of the rectum may also contribute to FI. Rectal hyposensitivity promotes fecal impaction and fecal seepage (57). FI in patients with fecal impaction is attributed to impaired rectal sensation and inadequate EAS contraction in response to rectal distension (58–60). Pudendal neuropathy or other conditions (central nervous system problems diminishing cognition, e.g., stroke) may result in diminished rectal sensation, which in turn can lead to excessive accumulation of stool, causing fecal impaction and FI. This has been referred to as *megarectum or terminal reservoir syndrome*.

Concurrent metabolic abnormalities such as hypothyroidism, hypercalcemia, and hypokalemia as well as contributing factors of inadequate fiber and water intake, immobility, and delirium also put the older institutionalized patient at risk for constipation, stool retention, and fecal impaction which can lead to overflow FI. In institutionalized patients, fecal impaction can occur in the cognitively impaired or bedridden individuals (61,62).

Treatment strategies for fecal impaction and megarectum may be different with a focus on keeping the rectum clear using laxatives as first-line treatment and not antimotility agents, which would exacerbate the problem. In some cases, low residue diet and rectal therapies such as suppositories and enemas are employed. Attention to bowel regimen is key. There are some reports of the use of antegrade continence enema in patients with fecal impaction

but this procedure is usually confined to younger patients with neurogenic bowel disorders (e.g., spina bifida and spinal cord injury). An antegrade continence enema is an enema which is administered through a tube in the abdominal wall. This tube is created via a surgical procedure by using the appendix or intestine. The enema, administered through the stoma of the tube, serves to flush stool toward the rectum. It is interesting to note that one paper found that FI score (incidence and quality of life) frequency did not change based on age or time from injury in patients with spinal cord injury (63).

In summary constipation can lead to FI. One factor may be treatment of chronic constipation and the consequences of this therapy. The other issue commonly seen in the elderly is overflow incontinence due to megarectum. This is a difficult problem to treat and is costly both in terms of quality of life and in terms of dollars spent in nursing care and hygiene products.

HOW CAN THE OFFICE RECTAL EXAMINATION HELP IN ASSESSING THE ETIOLOGY?

A complete office digital rectal exam can provide insight into the possible cause of FI as well as some of the consequences from this problem. The exam should begin with the pertinent parts of the general examination including assessment of the thyroid, a neurologic survey, and an abdominal examination.

The rectal exam should begin with the external inspection of the perineal area while the patient is placed in the left lateral position. The clinician should look for redness, excoriations, or skin breakdown, which can be due to constant moisture or wiping the area. Scars may indicate prior perineal surgery, which could impact pelvic floor neuromuscular control. Anal lesions such as fissures, and more importantly, fistulas, may also represent inflammatory conditions. It is also important to use this opportunity to rule out any perianal lesions such as melanoma, squamous cell carcinoma, or viral lesions. Before palpation, the anal area should be scratched gently to see if the “anal wink” can be solicited. When present, this may indicate integrity of the neural arc via the spinal cord. This sign can be absent if the patient is voluntarily contracting the musculature, but if absent, it might suggest S2–S4 nerve root or pudendal nerve damage (2). External palpation of the anus should be performed to elicit tenderness or masses; the presence of hemorrhoids might signify straining. Before proceeding to the internal exam, the patient should be asked to perform a Valsalva maneuver (2) and the examiner should observe if there is an open anus with protrusion of tissue, concerning for rectal prolapse. If there is any question of rectal prolapse, then the patient should be asked to do the Valsalva maneuver in a squatting position, as it may not be elicited in the left lateral position.

A careful internal exam can provide data on the neuromuscular and anatomic function of the perineum. The resting pressure is assessed with initial insertion of the examining finger and squeeze pressures by asking the patient to contract the EAS initially for a maximal effort and then relaxing and then to assess for fatigue (i.e., holding the squeeze effort for ≥ 30 s). These pressures determined by rectal exam have a high positive predictive

value when compared with anorectal manometry (64). The clinician can also check for the presence of stool in the rectal vault and its consistency, and assess for tenderness and protrusions (rectocele) (65). The PRM, a sling-like muscle from the pubic bone around the rectum, works with the EAS and IAS to control defecation by maintaining the anorectal angle. On digital examination when the patient is asked to squeeze, shortening of the PRM is detected at the distal part of the examining finger as a result of an upward and anterior motion of this muscle; at the same time contraction of the EAS can be detected, perceived as increased pressure at the proximal end of the examining finger. These contracted configurations of the PRM and EAS help to contain feces and promote continence (66,67). The degree of perineal descent (≥ 3 cm is abnormal) can be assessed with an expulsion effort.

A careful rectal exam to assess for tone and anatomical changes must be part of the FI evaluation.

TEST AND TREAT VS. EMPIRIC TREATMENT: WHICH IS BEST SUITED FOR OLDER PATIENTS?

The evaluation of the older person with FI should include a detailed history which includes the onset of the problem, frequency of bowel movements, volume of stool, pattern of the symptoms, and co-morbid diseases. A careful review of prior colon cancer screening should be done especially if this is a new change in bowel habits, as GI tract malignancy increases in prevalence in this age group. Polypharmacy is a common problem in older age persons; the physician should ask for recent changes in medications, evaluate for drug–drug interactions, and query about herbal and over the counter medications. A detailed physical exam including assessment of cognition, vision, mobility, and a detailed digital rectal exam help to gather the necessary data to consider systemic causes or factors, which could be contributing to the etiology and will impact treatment choices.

The dietary history may also be revealing as patients with lactose, sorbitol, or fructose malabsorption may present with incontinence. It is interesting to note that many over the counter medications contain binders that have lactose in them. Older patients who may have diabetes or be reducing their sugar intake may shop in the dietetic aisles of their supermarkets that are filled with products containing sorbitol, which can act as an osmotic laxative and with compromised muscle or nerve function this could overwhelm the anorectal mechanism and lead to incontinence.

There are few guidelines about when testing should be pursued. Lazarescu outlines four clinical scenarios that may benefit from formal testing: (i) suspected anal sphincter injury that could benefit from surgical intervention (ii) patients considering biofeedback therapy (iii) patients in whom history is out of proportion to exam findings and may have secondary gain, where testing could eliminate other etiologies (iii) IBD patients, particularly elderly patients, who are consider ileal pouch anal anastomosis, and are at risk of postoperative FI (68–70).

The utility of testing varies based on population and for the reasons mentioned above. A study of 80 patients showed that history alone identified a cause for FI in 11% of patients compared with physiologic testing which identified an abnormality in 55% of patients (71). A prospective study of 56 patients who underwent anorectal manometry and sensory testing found that testing data provided new information in 98% of patients and influenced management in 84% of patients (72). However, others have found less utility in manometry with low sensitivity and specificity for those with FI and chronic constipation (73). Endoscopic ultrasound (EUS) is proving to be an effective technology for assessment of sphincter integrity that may or may not correlate with the symptom, as sphincter abnormalities have been seen in asymptomatic controls. Manometry and structure sphincter assessment are helpful to document pre-surgical physiology and anatomy, to assess who may benefit from surgery (74). There are no definitive studies looking at the benefits of testing related to age.

As in other populations, the clinician has to weigh the benefit and burden on further testing vs. empiric treatment. History and office-based exam should guide the clinician to a narrower differential diagnosis and initial treatment plan. The patient's

co-morbidities, lifespan, and, if symptoms persist or the office-based exam suggests a structural defect which can be ameliorated by surgery, appropriate testing should be pursued. Since many of these tests require the ability to follow commands, careful assessment of cognition must be considered; patient cooperation with the office rectal exam will provide insight into the ability to obtain a more invasive accurate test requiring patient participation. Finally, in the older population a consideration of whether testing would change your management should be considered before initiation of any testing.

Testing for FI is best targeted to the underlying pathophysiologic mechanism and should be considered in the elderly, if the results of testing could impact on management. **Figure 1** outlines a clinical approach for testing and treatment in the elderly patient with FI. A clinician can use **Figure 1** to determine the possible pathophysiologic mechanisms which are causing the patient's FI. Although in many patients one mechanism may be the overwhelming cause of the symptoms, it is possible to have both a neuromuscular component and a compliance component contributing to FI.

Although manometry has long been considered to be of possible value for patients without fecal impaction or evidence of

Fecal Incontinence			
Assess history, perform physical examination			
	Fecal impaction and/or increased compliance	Decreased rectal compliance	Neuromuscular dysfunction
	↓	↓	↓
Symptoms (ask family or other caregivers in addition to patient)	Soiling, constipation	Diarrhea, urgency	Urge, passive loss of stool
	↓	↓	↓
Digital Rectal Exam Findings	Hard stool in rectum Evidence of leakage (erythema, skin breakdown)	Evidence of leakage	Weak resting and squeeze pressures Evidence of leakage
CONSIDER:	↓	↓	↓
Possible Etiologies	Medications Laxative use Dementia Mobility problems Muscular weakness/deconditioning	Colitis IBD Proctitis Pouch surgery Bacterial overgrowth	Prior OB injury Diabetes Neuropathy CNS/spinal disease Sphincter disruption
	↓	↓	↓
Testing Options	Plain x-ray Barium enema Colonoscopy (flexible sigmoidoscopy)	Colonoscopy (flexible sigmoidoscopy) Rectal compliance studies +/- anorectal manometry Stool cultures	Anorectal manometry +/- Anal ultrasound Neurophysiologic tests Defecography
	↓	↓	↓
Treatment	Disimpaction Enemas Establish toileting routine Keep rectum clear	Treat the underlying condition Low residue diet Constipating agents	Bulking agents Behavioral therapy Biofeedback Sacral nerve stimulation Surgery Colostomy

Figure 1. A clinical approach to fecal incontinence (FI) in the elderly. A history and physical exam with a detailed rectal exam can help suggest etiologies and direct testing and treatment options. (i) In impacted patients, a structural evaluation with X-ray, barium enema, or flexible sigmoidoscopy should be pursued (as it involves less preparation and sedation). However, if the patient has never had a colonoscopy, this should be undertaken. (ii) Diarrhea and evidence of leakage should prompt a search for bacterial overgrowth or inflammatory conditions. Stool cultures and endoscopic evaluation are the first-line tests followed by tests for rectal compliance and anorectal manometry. (iii) If there are multiple etiologies that include neuromuscular dysfunction, then tests of function such as anorectal manometry with or without ultrasound, neurophysiologic tests, and defecography should be considered. CNS, central nervous system; IBD, inflammatory bowel disease; OB, obstetrical trauma. (Adapted from Leung FW, Rao SSC. Fecal incontinence in the elderly. *Gastroenterol Clin N Am* 2009;38:503-11.)

megarectum, it should be noted that for the evaluation of FI in patients with possible neuromuscular dysfunction, ultrasound may provide information related to the integrity of the anal sphincters and may have an impact on the utility of an invasive intervention (75). It should be recognized that sphincter disruption can be seen in asymptomatic individual; therefore, clinical acumen and caution should inform any therapeutic decision.

Anal electromyography (EMG) and pudendal nerve latency testing are not currently endorsed by the AGA Technical Review (76); anorectal mucosal electrostimulation can provide neurophysiologic information to aid in a diagnosis (74,77). Other than endoscopy (flexible sigmoidoscopy and colonoscopy), most tests are not easily available and may be examiner dependent, therefore, treatment of FI should not be delayed while waiting for testing. For many patients, a therapeutic trial of medications can result in improvement. The decision to pursue further invasive testing should be determined by the benefit vs. burden of the test on the patient and the likelihood that the intervention would improve the quality of life of the patient. These decisions are best made on a case-by-case basis considering the patient's preferences, functional status, and co-morbidities.

History taking and physical exam will lead to a presumptive diagnosis of most etiologies of FI. Testing can be reserved for specific circumstances and should not delay further treatment. Cognitive evaluation is important as some tests require patient cooperation.

WHAT ARE THE MEDICAL TREATMENT OPTIONS FOR FI? WHAT EVIDENCE EXISTS FOR EFFECTIVENESS IN OLDER PATIENTS?

Treatment approach should be tailored to setting, co-morbidity, and patient preference. For community dwelling patients, there are some data about the role of education and dietary changes. A study of community dwelling adults found poor health literacy among FI suffers with older patients more likely to name FI as diarrhea, accidents, and less stool. They were also less likely to discuss the emotional impact of FI (78). Patient and caregiver education and counseling are part of FI treatment, as in any chronic condition.

A careful dietary history can help the clinician to counsel the community dwelling patients on which foods to avoid. Artificial sugars and caffeine can decrease colonic transit time leading to FI. In some patients, fatty foods may trigger symptoms. A recent nursing study of diet habits and FI showed that women were more likely to accept diet modification and that only as FI severity increased were participants more likely to cut back caffeine intake (79). Fiber supplementation has been recommended as part of treatment, with one trial showing the benefit of psyllium or gum Arabic on improving stool consistency and decreasing the number of incontinent stools (80).

In elderly patients who are institutionalized, the frequency of FI was reduced by 35% and the incidence of soiling by 42% with the use of a single osmotic agent with rectal stimulant (81). In patients with fecal impaction without resolution with laxatives, manual disimpaction may become necessary. Using laxatives to

treat impaction can result in incontinence of liquid stool and its use should be assessed and balanced. A study presented in abstract form demonstrated the presence of dyssynergic defecation in nursing home patients, which raises the suggestion that biofeedback therapy may be of benefit in this population (82). Biofeedback requires intact cognitive function and cooperation and may not be practical for all patients in this setting. Patients also need to have some EAS function during voluntary squeeze in order for this to be effective. Exercise has many beneficial effects on maintaining function, mobility, and strength. A randomized control trial of long-term incontinent nursing home residents showed low-intensity short exercise tasks every 2h during the week decreased risk factors associated urinary and FI but not frequency of FI due to a dyssynergic defecation pattern seen on manometry (40). Skin health did not improve with this type of intervention in a similar study. A similar study using an exercise intervention in the nursing home population decreased FI but this did not translate into improved skin health (83).

Antidiarrheal medications such as loperamide, diphenoxylate/atropine, and codeine can also be used but may have side effects. Loperamide, preferred as a first-line agent, acts locally on the intestine and possibly the anal sphincter, and does not cross the blood-brain barrier (84). Diphenoxylate crosses the blood-brain barrier and can have anticholinergic side effects. Studies that specifically address FI show loperamide to be superior to placebo (85,86) and diphenoxylate at reducing symptoms (87). Diet and medication can be used in combination; however, a recent double-blind randomized cross-over trial showed that majority of clinical efficacy was due to loperamide and not fiber supplementation (88). In older patients, the medication should be started at the lowest possible dose and observed for effect once infection has been ruled out; the dose can be increased if there is no effect and side effects are not present. For active seniors who are concerned about access to a bathroom, taking antidiarrheal medication before leaving the home may help reduce anxiety, soiling, or FI episodes.

Topical phenylephrine gel has been investigated in passive FI and in patients with ileoanal pouches due to colectomy from ulcerative colitis. Subjects had few FI episodes and increased resting and squeeze pressure compared with placebo, however, a localized dermatitis and a fleeting burning sensation were associated with the drug (89). Other effective medications in the treatment of FI include: tricyclic antidepressants (amitriptyline) with an 89% of participants reported improvement in symptoms (mean age 66) (90); bile salt binders; estrogen replacement therapy have been studied in the geriatric population with favorable results to reduce FI (91,92).

WHICH NON-MEDICAL OPTIONS FOR FI SHOULD ONE CONSIDER IN AN OLDER PATIENT?

A series of alternative treatments have been proposed in the literature. Many of these procedures are less invasive than surgical techniques. Anal plugs, made of expandable foam attached to a cotton string, are a less invasive option if leakage is a concern but

overall have either been ineffective or difficult to tolerate. These plug devices expand upon exposure to moisture in the rectum forming a barrier to solids but allowing air to pass. Anal plug devices have been slow for patients to adopt due to the discomfort (93–95). Clinical improvement parameters are focused on more subjective measures with improvement in various quality of life indices.

Several surgical procedures have been implemented for FI and depend on the anatomic defect documented after careful testing. Surgical treatments and associated devices can be reserved for those with medically refractory FI. A full review of surgical approaches to treatment is beyond the scope of this article.

Artificial anal sphincters, patient operated biomedical devices used to mimic the action of the PRM and provide external compression on the anal canal, have been investigated. This treatment may be recommended in patients with diabetes, neuropathy, or sphincter trauma as the cause of FI (96). Age over 75 is a contraindication for placement of an artificial anal sphincter, although an age-based analysis for this recommendation was not addressed (97). Of the available trial data with the oldest patients, efficacy ranges between 64 and 77% and complications of infection, mal-function, constipation, and erosion appear to be similar to trials with younger patients.

Sphincteroplasty, an older surgical technique, is a surgery where the damaged anal sphincter is overlapped and sewn together. The procedure is noted to be safe and the 5-year long-term data suggest that approximately half of patients have an acceptable long-term outcome. Much of this data are based on trials with a mean age of <50 (98–101). Orron published a small trial of 45 patients with age and sex-matched controls. Although the study has a mean age of <50, there were several older patients with prior obstetrical trauma. Results were similar for both anterior sphincteroplasty and posterior repair, 64 and 59%, respectively, with changes in anal sphincter muscle function and mucosal sensitivity (102). More data are needed in patients over 65 in order to assess the role of this surgical procedure on treatment.

Sacral nerve stimulation, which may work on both the sensory and motor components of defecation, has shown to be effective in symptom reduction, with almost half of subjects achieving continence (103). It is first-line treatment for patients failing conservative measures. Although this device is costly, it may be cost effective due to the high economic burden of FI, especially in those patients with a structurally deficient anal sphincter (104). Sacral nerve stimulation is an implantable device that stimulates the sacral nerves to influence the behavior of the pelvic floor muscles and bowels. Success, defined as a 50% reduction in FI symptoms, has been seen in 61–100% of trials (105). In a 3-year follow-up of patients (mean age 60.5), there was a positive impact on the quality of life (106). A recent trial of 23 patients, all over 65, showed comparable results to trials with younger patients. Number of FI episodes per 2-week period decreased from baseline to end of follow-up (mean 44 months). The authors conclude that this may be of benefit especially in those who do not respond to biofeedback (107).

A colostomy is the most anatomic altering procedure, usually reserved for severe colonic inertia and subsequent FI. For elderly patients who are less mobile, cognitively impaired, and are at risk for skin breakdown, this option provides ease of defecation and hygiene. For caregivers of such patients, a colostomy offers more scheduled bowel care, reducing caregiver burden and stress.

Other procedures, available at tertiary referral centers, include anal sphincter bulking therapies and radiofrequency ablation (Secca[®]) (108–110). Anal sphincter bulking therapies using injectable agents have shown significant improvement in FI; however, a recent randomized controlled trial using hyaluronic acid (NASHA Dx) showed improvement in the sham group as well as the treatment group (111). Current studies with older patients demonstrate acceptable safety profiles (112,113). The Secca[®] procedure, or radiofrequency ablation, trials have shown varying results, with most trials showing no benefit in FI scores (108,109). However, one trial with 5-year follow-up showed 84% of patients achieving >50% reduction in FI episodes; most of these patients were younger with a shorter mean duration of FI (110).

Empiric symptomatic treatment of diarrhea or constipation and behavioral changes are often efficacious in treating FI. Referral for more invasive interventions should be based on testing and should demonstrate promising results in older patients.

IN OLDER PATIENTS, WHAT ARE THE SPECIAL CONCERNS FOR TREATMENT THAT THE CLINICIAN SHOULD INCLUDE?

FI is a multifactorial process. As with other geriatric diseases, the clinician should evaluate all of the history and physical exam data to identify the factors and diagnoses that could contribute to the FI presentation. Clinicians may need to reach out to family members, home health aides, or nursing home staff to get additional history and when formulating a treatment plan.

Treatment for most patients should consist of a combination of education, lifestyle modification, and medical management. Education of the patient and his/her caregivers is very important when treating the elderly. FI-related education should focus on the importance of bowel habit training and scheduled defecation if appropriate, skin care, and the underlying reasons for the problem. Lifestyle modification is centered on diet changes that can increase colonic transit or prevent loose stool using increased fiber, and recommending removal of the offending food. If decreased mobility is part of the etiology of FI, then a bedside portable commode should be ordered. Patients may want to use incontinence pads to help prevent soiling. Most medications noted above have been used in older patients without many side effects. Tricyclic antidepressants have anticholinergic properties to which older patients are more susceptible as well.

Skin breakdown is a major consequence of FI as continual moisture can lead to a lack of skin integrity. Frequent changing and wipes should be used to keep the area dry. Barrier creams such as zinc oxide or hydrocolloids maybe appropriate. In patients who are less mobile, FI is a source of insult that can lead to the development of pressure sores.

Older patients who have multiple caregivers, are at risk for polyp-harmacy, and have functional limitations that should be addressed as part of any treatment plan.

CAN BIOFEEDBACK BE DONE IN THE ELDERLY? AND WHAT PATIENT FACTORS CAN PREDICT ITS SUCCESS?

Biofeedback is a well-developed treatment option for patients that utilizes operant conditioning whereby the patient is provided visual data on rectal distention using a balloon and taught to increase EAS pressure under the guidance of a trained therapist. A requirement for biofeedback to be successful is being able to understand the requirements and being able and motivated to participate. The patient must have a partially intact EAS that can generate some pressure with voluntary squeeze.

A randomized control trial comparing standard care with biofeedback in patients with FI showed conservative treatment improved continence, quality of life, and anal sphincter pressure compared with biofeedback (114). Byrne examined the short-term efficacy for biofeedback for FI. The mean age of patients was 61.9 years. Although only 15% of patients completed the entire trial, patients with older age (OR 1.02), female gender, and more severe FI were more likely to benefit compared with others (115). Another study found similar results with respect to age (116). This study also found that patients with normal anal relaxation, no prior constipation and normal or diminished rectal compliance were more likely to benefit from biofeedback. Biofeedback was superior to pelvic-floor exercises in patients (mean age 59.6) who failed conservative therapy (117). A review on the topic also found some benefit, however, trials varied in design and standardization of outcomes, which may explain the differences in outcomes (118).

At this time, biofeedback with skilled practitioners may be an appropriate initial therapy for some patients with FI who have failed conservative treatment.

FUTURE DIRECTIONS

FI is a serious quality of life problem that is destined to become more prevalent as the population ages. There are, however, promising developments for the future. Research involving alternative therapies that are less invasive for elderly patients should be encouraged. To learn more about the symptom and development of incontinence over the spectrum of age groups, it is essential to collect data for age-specific analysis. There also seems to be quality of life data available but these studies do not really directly address the impact on function. Doing so, may lead to improved strategies for addressing the problem.

Defining what constitutes the population of elderly presents a challenge as the population ages. Most of the studies performed seem to address an age cutoff at age 80 but as the population ages and longevity increases, it is crucial to develop data acquisition on the young old (age 65–75), the old-old (75–85) and the oldest old (>85) with consideration of the functional status at each age cluster. It is this latter group, the oldest old, that is the popula-

Table 2. Key points: FI in the elderly

• FI has an increasing prevalence among older patients not explained by co-morbidities
• Age-related anatomic changes include decreased squeeze pressures (a neuromotor factor for maintaining continence)
• Bowel symptoms and some medical co-morbidities (renal disease, depression, and obesity) are emerging as important risk factors for development of FI in older patients
• Diarrhea and FI: <ul style="list-style-type: none"> ◦ Patients with FI may inaccurately report diarrhea as the presenting problem ◦ Diarrhea can be mislabeled as primary FI ◦ In some cases, diarrhea may result in FI
• Testing can be reserved for specific circumstances and should not delay further treatment
• Empiric symptomatic treatment of diarrhea or constipation and behavioral changes are often efficacious in treating FI
• Cognition, vision, and gait problems might be targets for a treatment plan in older patients with FI
• Biofeedback with skilled practitioners may be an appropriate initial therapy for some patients with FI who have failed conservative treatment
• Referral for more invasive interventions should be based on testing and demonstrate promising results in older patients
• Evaluation of older patients in any care setting should prompt review of any FI symptoms
FI, fecal incontinence.

tion with the most rapid growth. In addition, there appears to be data and reasonable therapeutic options for consideration at the end of life; what are lacking are good strategies for palliative care for long-term ongoing chronic problems such as FI and treatment for the homebound. Finally, addressing the risk factors that lead to FI in the elderly may prevent the development of this symptom which is not only quality of life limiting, but also is embarrassing for the patient, costly for families and society, and challenging to treat.

SUMMARY

Primary care physicians and gastroenterologists need to inquire about FI and related symptoms and utilize the older patient's extended care network to help evaluate and treat these symptoms. To better craft a multi-pronged plan to improve symptoms and decrease complications, providers need to demonstrate an increasing awareness to other co-morbidities and the patient's functional status. FI exerts a large economic and psychological burden to our patients and their caregivers, which is under recognized by society. By tailoring assessment and treatment to the elderly, gastroenterologists, primary care physicians, and geriatricians can help to ameliorate their symptoms. A summary of the major clinical points for the approach to FI in the elderly and its treatment is provided in **Table 2**.

CONFLICT OF INTEREST

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