The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Perioperative Evaluation and Management of Frailty Among Older Adults Undergoing Colorectal Surgery

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These guidelines should not be deemed inclusive of all proper methods of care nor exclusive of methods of care reasonably directed toward obtaining the same results. The ultimate judgment regarding the propriety of any specific procedure must be made by the physician in light of all the circumstances presented by the individual patient.

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STATEMENT OF THE PROBLEM

Aging of the population has led to increasing rates of older adults requiring surgery, and due to the increased rate of postoperative morbidity and mortality associated with these patients, special considerations should be made before pursuing surgical intervention in this patient population.[1] Older adult patients presenting to a colorectal surgery practice often have comorbidities and impaired functional status in addition to their presenting condition that needs to be considered when recommending a care plan. Specifically, older adults with frailty could be at risk for poor surgical outcomes.[2] In general, frailty can be defined as an accumulation of deficits resulting in an inability to tolerate stress. Fried's phenotypic definition of having 3 of the following 5 traits is the basis for the objective evaluation of frailty: slow walking speed, impaired grip strength, self-reported declining activity level, unintended weight loss, or exhaustion.[3,4]

It is especially challenging for surgeons to fully understand the impact of a proposed surgical intervention in the context of benefit versus harm among vulnerable patients. Reliable preoperative clinical assessment is essential to stratify risk and assist with decision-making under these circumstances. Improving the care of older and/or frail surgical patients begins with acknowledging the fact that frailty is more predictive of surgical outcomes than chronological age and that currently available frailty assessment tools are reliable and useful.[5–7]

Accurately assessing frail older patients facilitates opportunities to identify and address vulnerabilities that can potentially improve outcomes. Four major emerging categories for quality improvement in these patients include using prehabilitation, providing multidisciplinary care in partnership with geriatricians or practitioners with geriatrics expertise, adopting programs and techniques aimed at reducing stress during and after surgery, and assessing goals of care based on a consideration of realistic outcomes. These categories are not mutually exclusive, and optimal perioperative care should ideally encompass aspects of each category. In the following guideline, we evaluate the evidence and provide recommendations regarding the perioperative assessment and management of frail older patients undergoing colorectal surgery. Of note, from a practice standpoint, following recommendations regarding the care and management of frail older patients may require resources from a hospital or health system organization. Understandably, limited access to support may be a barrier to adoption at the individual practitioner level. Although previous ASCRS Clinical Practice Guidelines address issues relevant to the care of frail older patients (eg, bowel preparation, prevention of thromboembolic disease, and survivorship), these topics are beyond the scope of this guideline.

MATERIALS AND METHODS

As no previous ASCRS Clinical Practice Guideline has specifically addressed the topic of frailty, this guideline is an original body of work and not based on a particular previous publication. A systematic literature search limited to the English language and to studies with human subjects was performed using PubMed, Medline, EMBASE, Cochrane Database of Collected Reviews, and CINAHL databases from January 1, 2014, through November 24, 2021,[8] using medical subject headings and keywords outlined in Appendix A at http://links.lww.com/DCR/B899. A total of 2235 articles were identified using the defined inclusion and exclusion criteria. Directed searches using embedded references from primary articles were performed in selected circumstances and yielded an additional 189 articles (Fig.1). After the duplicates were removed, 1978 articles were evaluated for their level of evidence favoring clinical trials, meta-analyses/systematic reviews, comparative studies, and large registry retrospective studies over single institutional series, retrospective reviews, and peer-reviewed observational studies.[9,10]

A final list of 166 sources was evaluated for methodologic quality; the evidence base was examined, and a treatment guideline was formulated by the subcommittee for this guideline. The final grade of recommendation and level of evidence for each statement were determined using the Grades of Recommendation, Assessment, Development, and Evaluation system (Table 1).[11] When agreement was incomplete regarding the evidence base or treatment guideline, consensus from the committee chair, vice-chair, and 2 assigned reviewers determined the outcome. Members of the ASCRS clinical practice guidelines committee, other fellows of ASCRS, and 3 geriatricians worked in joint production of these guidelines from inception to final publication. Recommendations formulated by the subcommittee were reviewed by the entire clinical practice guidelines committee and members of the ASCRS geriatrics task force. The guideline was peer-reviewed by *Diseases of the Colon and Rectum*, and the final guideline was approved by the ASCRS executive council. In general, each ASCRS clinical practice guideline is updated every 5 years. No funding was received for preparing this guideline, and the authors have declared no competing interests related to this material. This guideline conforms to the appraisal of guidelines research and evaluation checklist.

1. **Treatment recommendations regarding colorectal surgery should consider patients' degree of frailty (ie, physiological age) rather than chronological age. Grade of recommendation: strong recommendation based on high-quality evidence, 1A.**

Chronological age has been one of the most widely used variables in research assessing tolerance and outcomes

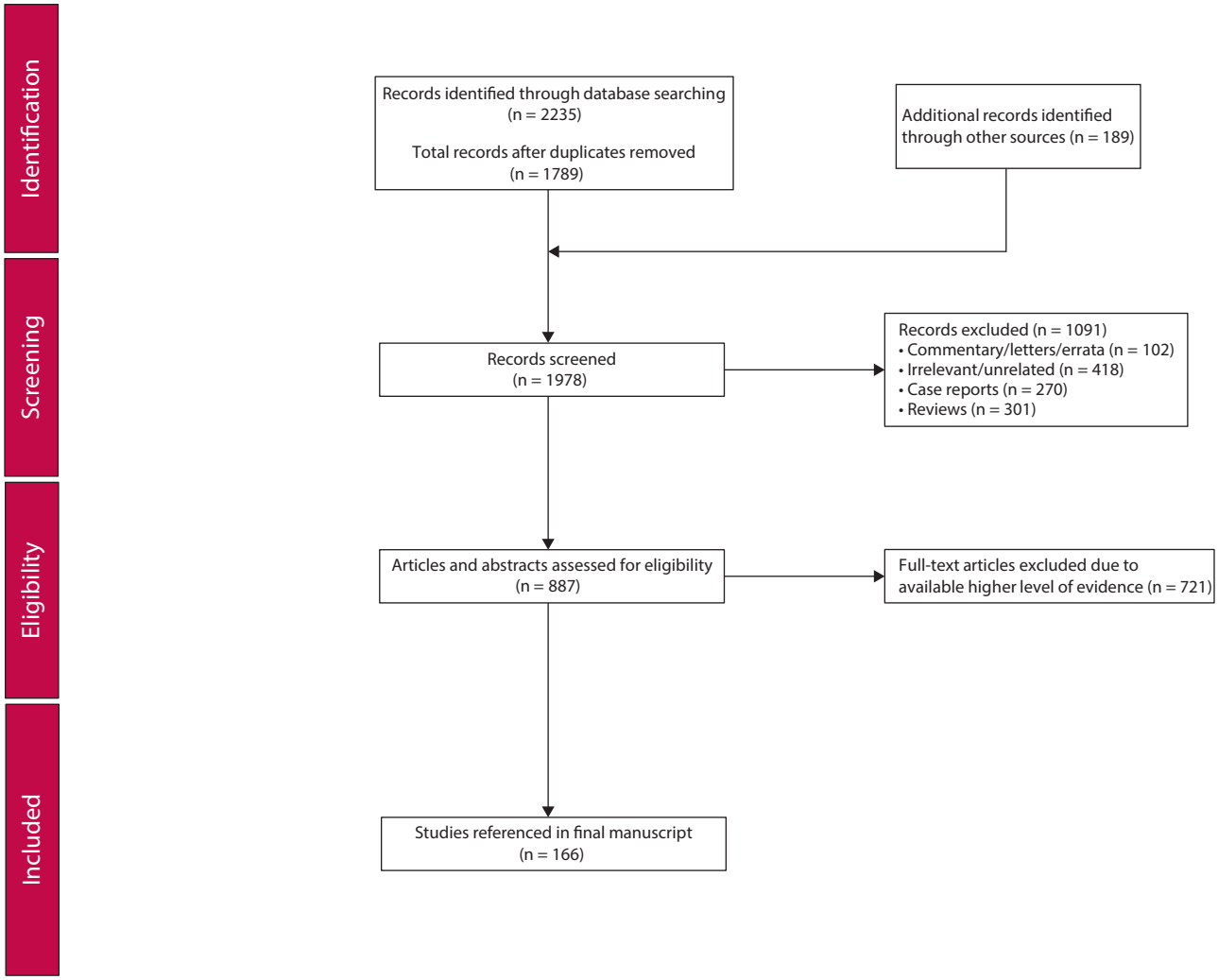

FIGURE 1. PRISMA literature search flow sheet. PRISMA = preferred reporting items for systematic reviews and meta-analyses.

of treatments across a variety of settings, including surgery. Many studies compare outcomes of patients older and younger than a certain age. Because Medicare eligibility starts at 65 years of age, this age has often been chosen as the cutoff to define older patients; however, as life expectancy has increased over time, older age reference points of 70 and 75 years have been used.[12–18] Studies comparing groups of patients based on chronological age have reported variable findings in terms of an association between age and outcomes.[19]

Age as a study variable has a significant limitation in that it is a nonmodifiable risk factor, and researchers have argued that age should not be the sole determinant when making treatment decisions.[2,20] Geriatricians, in particular, assert that instead of relying on age, patients' fitness or frailty should be assessed and taken into consideration when making clinical decisions.[20,21] Although it is universally accepted that frail patients are more vulnerable to adverse events due to reduced reserve capacity across multiple physiologic systems, it is important to acknowledge that the concept of frailty has not been uniformly assessed in the literature. Nevertheless, results linking frailty to adverse postoperative outcomes are remarkably consistent using a variety of frailty measurement tools.[22–28]

In terms of the ability to assess frailty as a predictor of postoperative outcomes, a 2015 systematic review evaluated 6 prospective studies and examined whether the comprehensive geriatric assessment (CGA), which addresses multidisciplinary components related to patients' physical, mental, and psychosocial well-being and functional capabilities, predicted surgical outcomes in 1019 patients who underwent a variety of elective oncologic operations.[29] This study showed that dependency in instrumental activities of daily living (IADLs: preparing hot meals, grocery shopping, making telephone calls, taking medicines, and managing money), fatigue, and frailty were significantly associated with overall complications, and that dependency in IADL was predictive of discharge to an institutional setting (ie, not the patient's home). Although major complications were more frequent in patients with cognitive impairment

TABLE 1. The GRADE system: grading recommendations

Grade	*Description*	*Benefit versus risk and burdens*	*Methodologic quality of supporting evidence*	*Implications*
1A	Strong recommendation, high-quality evidence	Benefits clearly outweigh risks and burdens or vice versa	RCTs without important limitations or overwhelming evidence from observational studies	Strong recommendation; can apply to most patients in most circumstances without reservation
1B	Strong recommendation, moderate-quality evidence	Benefits clearly outweigh risks and burdens or vice versa	RCTs with important limitations (inconsistent results, methodologic flaws, indirect or imprecise) or exceptionally strong evidence from observational studies	Strong recommendation; can apply to most patients in most circumstances without reservation
1C	Strong recommendation, low- or very low-quality evidence	Benefits clearly outweigh risks and burdens or vice versa	Observational studies or case series	Strong recommendation but may change when higher-quality evidence becomes available
2A	Weak recommendation, high-quality evidence	Benefits closely balanced with risks and burdens	RCTs without important limitations or overwhelming evidence from observational studies	Weak recommendation; best action may differ depending on circumstances or patients' or societal values
2B	Weak recommendation, moderate-quality evidence	Benefits closely balanced with risks and burdens	RCTs with important limitations (inconsistent results, methodologic flaws, indirect or imprecise) or exceptionally strong evidence from observational studies	Weak recommendation; best action may differ depending on circumstances or patients' or societal values
2C	Weak recommendation, low- or very low-quality evidence	Uncertainty in the estimates of benefits, risks, and burden; benefits, risks, and burdens may be closely balanced	Observational studies or case series	Very weak recommendations; other alternatives may be equally reasonable

Used with permission from *Chest* 2006;129:174–181.[11]
GRADE = Grades of Recommendation, Assessment, Development, and Evaluation; RCT = randomized controlled trial.

and dependency in IADL and activities of daily living (ADL: walking, dressing, bathing, eating, getting into and out of bed, and toileting), age, per se, was not associated with a higher complication rate. Similarly, a Cochrane review and meta-analysis of randomized controlled trials of patients who underwent surgery for hip fracture that included 1316 patients aged ≥65 years showed that using the CGA preoperatively and/or postoperatively compared to usual surgical care may reduce mortality (relative risk 0.85; 95% CI, 0.68–1.05). In the same Cochrane review, analysis of 941 patients who had data reporting discharge destination found that using geriatric assessment reduced the rate of discharge to a higher level of care (ie, needing care in an institutional or dependent living setting; relative risk 0.71; 95% CI, 0.55–0.92).[30] Finally, multivariable analysis of a prospective study of 980 patients aged ≥75 years undergoing oncologic surgery demonstrated that frailty (stratified by the number of impairments in the geriatric assessment) was associated with 6-month mortality after surgery (OR 1.14 for each unit increase in CGA score; $p = 0.01$). Interestingly, the ASA Physical Status Classification System Score, a commonly used marker of preoperative functional status, and age were not associated with 6-month mortality in this study.[31]

Similarly, a multivariate logistic regression analysis of 7337 patients from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) who underwent elective colorectal cancer resection (mean age 65.8 ± 13.6 years) showed that frailty, assessed using an 11-point modified frailty index (m-FI), not age, was independently associated with readmission within a month of surgery (OR 1.4; 95% CI, 1.1–1.8).[32] Meanwhile, another ACS-NSQIP study of 295,490 patients who underwent colorectal surgery for any indication between 2011 and 2016 showed that frailty, as assessed using a 5-item m-FI, was associated with significantly higher risks of prolonged length of stay (OR 1.24; 95% CI, 1.20–1.27), discharge to an institutional setting (OR 2.80; 95% CI, 2.70–2.90), 30-day serious morbidity (OR 1.39; 95% CI, 1.35–1.43), and mortality (OR 2.00; 95% CI, 1.87–2.14).[27] Like much of the literature regarding frailty, these studies used large databases and retrospective methodology that put more emphasis on the metrics of frailty obtained from a chart review (ie, comorbidities and reported dependence) than on objective office-based frailty measures (ie, grip strength and walking time).

2. Frailty screening in the ambulatory setting identifies vulnerable and frail older adults. Grade of recommendation: strong recommendation based on high-quality evidence, 1A.

Frailty screening tools should, ideally, consider patients' mobility, functional activity, cognitive function, comorbidities, and nutritional status. Although the CGA[33] is considered the benchmark for frailty assessment and generally includes follow-up care such as geriatric-specific optimization interventions,[34] it may be time-consuming to administer, and a geriatric assessment composed of

questionnaires assessing different domains of well-being can often be used instead.[2,35] Other frailty screening tools, developed to facilitate the timely assessment of patients' frailty status by surgeons in the ambulatory setting, can be as effective as the CGA in predicting postoperative complications.[23,36,37]

In a prospective study of 460 patients older than 70 years undergoing surgery for a variety of cancers, Audisio et al[36] showed that moderate/severe fatigue, dependency in IADL, and an abnormal Eastern Cooperative Oncology Group Performance Status were the most important independent predictors of postoperative complications and that disability, as assessed by dependency in ADL or IADL or an abnormal Eastern Cooperative Oncology Group Performance Status, was associated with an extended hospital stay. In a prospective, multicenter study of 263 patients aged ≥70 years undergoing surgery for solid tumors, Huisman et al reported that a simple Timed Up and Go test (ie, the time a patient requires to get out of a chair, walk 3 m, and return to the chair) predicted major postoperative complications (OR 3.43; 95% CI, 1.13–10.36), was associated with a prolonged length of stay (OR 4.21; 95% CI, 1.10–24.73), and required more than 3 specialists during the hospitalization (OR 5.39; 95% CI, 1.85–15.77). In the same study, both impaired nutritional status and ASA score greater than or equal to 3 correlated with poor postoperative outcomes.[38] Jones et al,[39] in a prospective cohort study, evaluated 81 patients aged >65 years undergoing elective colorectal surgery and showed that more than 1 fall in the 6 months before the operation was associated with a higher rate of postoperative complications (59% versus 25%; $p = 0.04$) and postoperative institutionalization (52% versus 6%; $p < 0.001$). Similarly, the 11-point m-FI and the Risk Analysis Index (RAI), a 14-question survey measuring frailty among surgical patients, have also been shown to predict prolonged length of stay, need for intensive care unit admission, discharge to nursing home, and short- and long-term mortality after various surgical procedures, including colectomy.[40–46] In another study evaluating the use of RAI, Shah et al evaluated 984,550 patients from the ACS-NSQIP database who underwent a variety of inpatient operations during an 8-year period. In this study, frailty, as measured using the RAI, was associated with increased complication rates and failure to rescue (ie, mortality after a complication) after both low- and high-risk procedures.[47]

In terms of other ways to potentially identify vulnerable patients before and after surgery, assessing sarcopenia (ie, loss of muscle mass and strength) continues to gain traction. Loss of muscle mass[48] and myosteatosis (ie, fat deposits in muscle) can be quantified by a CT scan by measuring the skeletal muscle index at the L3 vertebral body, Hounsfield unit average calculation of the psoas muscle, total psoas muscle volume, intramuscular adipose content, or the dorsal muscle group area, and these measures have been shown to correlate with postoperative mortality, complication rates, and unfavorable cancer-related survival.[49–52]

Beyond elective surgery, frailty can also be assessed in the emergency setting. Zattoni et al showed that the Flemish version of the Triage Risk Screening Tool (fTRST) can be used in the emergency setting to aid in decision-making for frail older patients. The fTRST, a simple method to estimate postoperative risk, evaluates 5 weighted factors including experiencing cognitive decline (2 points), living alone or having no help available at home (1 point), having reduced mobility or having fallen in the past 6 months (1 point), being hospitalized in the past 3 months (1 point), and requiring polypharmacy (≥5 different medications, 1 point). This prospective study evaluated 110 frail older patients undergoing emergency abdominal surgery for a variety of indications and demonstrated that an fTRST score greater than or equal to 2 was predictive of increased morbidity, mortality, and length of stay.[53] Using such screening tools to assess frailty preoperatively may help patients and their caregivers decide on a personalized treatment plan that aligns with their goals of care. Although not an exhaustive list, Table 2 summarizes frailty screening tools used in patients who underwent colorectal surgery. Typically, frailty screening uses tools that are chosen based on practice patterns and health system resources in collaboration with a geriatric practitioner.

3. Treatment plans for frail older adults should align with patients' goals of care and should be based on a discussion regarding realistic outcomes. Grade of recommendation: strong recommendation based on low-quality evidence, 1C.

When contemplating the care plan for a frail patient, the goals of care should be discussed with the patient, engaged family, caregivers or advocates, and other members of the multidisciplinary team that may include representatives from surgery, geriatrics, palliative care, primary care, oncology, radiation oncology, and so on.[54] Typically, these discussions address domains such as anticipated longevity, functional status, independence, and comfort.[55,56] In circumstances involving potential surgical intervention, deliberating whether to proceed with surgery should consider the likely treatment outcomes (including curative versus palliative objectives) and patient and family preferences.[57] A realistic picture should be presented based on the anticipated risks of morbidity, mortality, and cognitive decline for each of the proposed treatment options taking into consideration the patient's unique presentation, degree of frailty, and functional status.[58] Specifically, patients may value their functional performance and cognitive status more than other treatment-related considerations and, as a result, patients may base their decisions on the likelihood of maintaining a certain level of performance (this concept is further discussed in statement no. 11). Of note, the degree of cognitive decline associated with

TABLE 2. Selected frailty screening tools evaluated in colorectal surgery patients

Tool	*Acronym*	*Range of scores*	*Cutoff indicating frailty*	*Population tested*
Geriatric-8	G8	0–17	≤14	CRC[22]
Timed Up and Go test	TUG	n/a	≥20 s	CRC[23]
4-m gait speed	Gait speed	0–2 m/s	<0.8–1.0 m/s	CRC[24]
6-min walking distance	6MWD	n/a	<20 m	CRS[a,25]
6-min walk test	6MWT	n/a	<20 m	CRS[a,25]
Question about falls in past 6 months	Falls	n/a	≥2	CRC[39]
Risk analysis index	RAI	0–81	≥30	Noncardiac including CRS[26]
Modified frailty index (11-item)	mFI	0–11	>3	CRC[32]
Modified frailty index (5-item)	mFI	0-5	≥2	CRS[27]
Multidimensional prognostic index	MPI	0–1.0	>0.33	CRC[28]
Flemish version of the Triage Risk Screening Tool	fTRST	0–6	≥2	Emergency surgery including CRS[53]

CRC = colorectal cancer; CRS = colorectal surgery.
[a]Also used as a measure of recovery of function.

an individual surgery or anesthetic exposure is unknown. However, the Mayo Clinic performed a 5-year longitudinal study of 1819 patients aged ≥70 years and showed that exposure to general anesthesia and surgery was associated with subtle accelerated cognitive decline.[59]

On an individual patient basis, it is important to clarify what matters most to patients, and online resources are available to facilitate these discussions (eg, the American Geriatrics Society's Health in Aging Foundation website, https://www.healthinaging.org/age-friendly-healthcare-you/care-what-matters-most). In practice, it may be helpful to include a geriatrician and/or the patient's primary care physician in treatment planning discussions. When planning operative treatment, it is helpful to clarify patients' current living situation and existing support, to communicate goals for postoperative disposition as well as code status, and to have patients designate a surrogate decision-maker. Importantly, clinicians should recognize that patients' goals of care may change during the perioperative period.[55]

In the emergency setting, it may be difficult to have comprehensive goals of care discussions with patients, particularly if they are septic or unstable, have cognitive impairment, or are otherwise unable to have a meaningful discussion. An interdisciplinary, 23-member expert panel recommended a structured communication framework addressing 9 key elements to facilitate decision-making among seriously ill older patients with emergency surgical conditions.[60] The difficulties with having discussions in the setting of emergency circumstances highlight the importance of taking the opportunity to engage patients and their families in early goals of care discussions, especially when patients have multiple comorbidities or a condition that may result in a subsequent emergency (eg, obstructing colorectal cancer).[61,62]

4. Cognitive function should be assessed preoperatively in frail older adults. Grade of recommendation: strong recommendation based on low-quality evidence, 1C.

The prevalence of dementia in the United States is estimated to be 5% among 70- to 79-year-olds, 24% among 80- to 89-year-olds, and nearly 40% among people older than 90 years.[63] Meanwhile, mild cognitive impairment (MCI) is distinguished from dementia in that the impairment is not severe enough to interfere with independent function. MCI is common among older adults, even those living independently, and affects up to 50% of patients older than 65 years.[64] Although the American College of Surgeons (ACS) and the American Geriatrics Society (AGS) recommend routinely assessing preoperative cognitive function and advocate using cognitive assessment tools such as the Mini-Cog preoperatively to detect MCI,[65] the results of studies evaluating an association between MCI and postoperative outcomes such as complications, length of stay, and mortality are mixed and studies have been underpowered.[66,67]

Nonetheless, the most compelling reason to evaluate for cognitive impairment preoperatively is to predict and prepare patients and caregivers for the likelihood of postoperative delirium; preoperative MCI is one of the strongest predictors of postoperative delirium.[68] In patients found to have cognitive impairment, it is advisable, when feasible, to involve a geriatrician and/or psychiatrist and to implement delirium risk reduction interventions such as orientation to staff and surroundings, sleep hygiene, early mobilization, and optimization of vision and hearing.[69–71] In addition, decision-making capacity may be diminished in patients with cognitive impairment or dementia, and family members, health-care surrogates, and primary care physicians should be included in the decision-making process in appropriately selected patients.[72] Upon returning home postoperatively, patients with cognitive or memory impairment may benefit from close surveillance from caregivers or home care services.

Culley et al studied 211 patients who underwent orthopedic surgery using the Mini-Cog, which includes a 3-item recall test and a clock-drawing task that tests visuospatial representation, memory, recall, and executive function. In this prospective study, 24% of the patients were identified with preoperative cognitive impairment (Mini-Cog score ≤2), which was associated with an increased

postoperative incidence of delirium (21% versus 7%; OR 4.52; 95% CI, 1.30–15.68).[73] Cognitive impairment, again measured using the Mini-Cog, was also observed in 21% of 1003 patients older than 70 years before undergoing major elective oncologic surgery in the prospective, multicenter Geriatric Oncology Surgical Assessment and Functional rEcovery after Surgery study.[74] Another method for evaluating preoperative, baseline cognitive function is the 12-item Self-Administered Gerocognitive Examination, which detects MCI and early dementia among geriatric patients.[75] Benefits of the Self-Administered Gerocognitive Examination include its digital format, which can be administered while patients are in waiting rooms or even at home, and its ability to trend serial results over time.[76]

5. Frail older adults should be screened for postoperative signs and symptoms of delirium and treated appropriately. Grade of recommendation: strong recommendation based on moderate-quality evidence, 1B.

Delirium, an acute confused state with hallmarks of fluctuating inattention and global cognitive dysfunction, occurs in up to 50% of older adults postoperatively[77] and may remain unrecognized in up to two-thirds of cases.[78] Delirium is associated with functional and cognitive decline, increased morbidity and mortality, longer lengths of stay, higher rates of nursing home placement, and increased health-care costs.[79–85] Moreover, as complications may present atypically in older adults, clinicians should recognize that postoperative delirium may be an indicator or manifestation of an underlying complication. Maintaining an appropriate index of suspicion in frail older adults experiencing postoperative delirium and initiating a broad clinical workup under these circumstances may be advised (eg, evaluating for infections, electrolyte abnormalities, and drug side effects).[86] The Confusion Assessment Method screens for delirium by evaluating for 1) mental status changes with acute onset and fluctuating severity, 2) inattention, 3) disorganized thinking, and 4) an altered level of consciousness. Using the Confusion Assessment Method, the presence of 1, 2, and either 3 or 4 confirms the diagnosis of delirium.[87] Patients experiencing delirium may benefit from geriatric or neuropsychiatric specialist consultation to assist with perioperative management as well as multimodal, nonpharmacologic interventions such as cognitive stimulation, early mobilization, preservation of the sleep-wake cycle, and ensuring adequate hydration.[70,71,83]

Importantly, delirium can be prevented in up to 50% of patients by using a delirium prevention bundle.[88] Watt et al performed a meta-analysis of 8557 patients older than 60 years who underwent elective orthopedic, cardiac, or abdominal surgery and found a pooled postoperative delirium incidence rate of 18.4% (95% CI, 14.3–23.3). In this study, the strongest predictors of postoperative delirium were a personal history of delirium (OR 6.4; 95% CI, 2.2–17.9), frailty (OR 4.1; 95% CI, 1.4–11.7), and cognitive impairment (OR 2.7; 95% CI, 1.9–3.8). In this study, prognostic factors that could potentially be modified to reduce the incidence of delirium included decreasing the use of psychotropic medications, smoking cessation, and increasing caregiver support.[68] Another intervention shown to decrease the incidence of delirium is avoiding or reducing the use of specific medications such as opioids, benzodiazepines, antihistamines, atropine, sedative hypnotics, and corticosteroids.[89] In 2019, in an effort to reduce adverse drug events in older patients and to decrease the incidence of delirium, the AGS updated the Beers Criteria describing potentially inappropriate medication use in patients aged ≥65 years and specifically highlighted the detrimental effects related to antipsychotics, benzodiazepines, H2 receptor antagonists, anticholinergics, and meperidine.[90]

6. Frail older adults may benefit from preoperative, multimodality optimization (ie, prehabilitation). Grade of recommendation: strong recommendation based on moderate-quality evidence, 1B.

Prehabilitation refers to a multidisciplinary, multifaceted intervention to prevent or minimize surgery-related functional decline and improve perioperative outcomes.[91] Multimodal prehabilitation can include exercise training, nutritional therapy, and anxiety reduction strategies along with optimization of comorbidities and smoking/alcohol cessation. Although the recommended duration, location, and specific multidisciplinary components of the intervention vary widely in the literature, there is sufficient evidence to support prehabilitation programs overall.[92–96] A systematic review and meta-analysis of 26 studies with heterogeneous methodologies compared the impact of prehabilitation versus no prehabilitation on outcomes after major abdominal surgery and demonstrated that patients receiving prehabilitation had significantly lower rates of overall (OR 0.61; 95% CI, 0.43–0.86), pulmonary (OR 0.41; 95% CI, 0.25–0.67), and cardiac complications (OR 0.46; 95% CI, 0.22–0.98).[97] However, this study did not report patients' ages or whether patients were frail, and the definition of prehabilitation was not standardized across the different studies.

Prehabilitation should be tailored to the results of the geriatric assessment, and although components can be prescribed in broad strokes by surgeons (eg, increase activity and increase protein intake), more formal recommendations are typically made by the multidisciplinary team performing the geriatric assessment. The literature regarding the effects of prehabilitation on perioperative outcomes implies that prehabilitation is likely not a standalone intervention but an important component of a multiphase, longitudinal, and multidisciplinary pathway for vulnerable patients.[98,99] As part of the evolving literature,

the ASCRS Enhanced Recovery After Colon and Rectal Surgery Clinical Practice Guideline, published in 2017, included prehabilitation as a 2B recommendation grade, whereas the current guideline upgraded this recommendation to a 1B grade.[100]

Although the duration of prehabilitation should be individualized to patients' needs and circumstances, intervention may range from as short as 5 days to as long as 6 weeks. Many of the studies evaluating prehabilitation used prolonged programs, and most models suggest a duration of 4 to 6 weeks for prehabilitation.[101] Exercise programs, the mainstay of prehabilitation, may be conducted at home, an outpatient facility, or an inpatient unit and may include walking, functional activities, balance exercises, and resistance and strength training. The importance of exercise under these circumstances is underscored by a study that evaluated the activity level of patients undergoing colorectal surgery using wearable technology. In this prospective, observational study, patients wore a tracking device for 30 days before surgery, and "active" patients were classified as those taking more than 5000 steps/day. Of the 99 study patients, 40.4% (n = 40) were classified as active and experienced fewer overall complications (27.5% versus 55.9%; p = 0.005) and serious complications (5% versus 20.3%; p = 0.03). Furthermore, increased preoperative activity was associated with a decreased risk of having any postoperative complication (OR 0.38; 95% CI, 0.15–0.90) on multivariable analysis.[102] As this was a nonrandomized trial, it should be noted that preoperative activity level was likely associated with the degree of frailty and, in this context, less activity may be a surrogate marker for comorbid conditions and impaired functional status. As such, the degree to which improved outcomes were related to the prehabilitation activity, as opposed to the patients' preoperative condition, remains unclear.

Prehabilitation programs can also address weight loss and poor nutritional status, which are predictors of worse outcomes in older adults.[103] Nutritional optimization, another pillar of prehabilitation, can potentially decrease ileus incidence and severity, improve appetite, promote normoglycemia, attenuate the perioperative inflammatory response, and provide sufficient protein intake for anabolic metabolism to maintain lean body mass.[104] In addition, nutrition supplementation synergizes with exercise activity in geriatric patients; 140 g of carbohydrates taken 3 hours before exercising increases liver and muscle glycogen stores and facilitates the completion of exercise sessions.[105] Given the importance of nutritional optimization, dieticians are often part of the multidisciplinary team performing the geriatric assessment and make recommendations regarding nutrition and patient-specific protein and calorie intake.

Prehabilitation programs also typically include a psychosocial domain that may involve educating patients regarding their disease process, promoting lifestyle modifications, and managing anxiety and depression.[92–94] The incidence of depression increases with age, and depression is associated with worse postoperative outcomes, longer postoperative recovery times, increased healthcare use, and higher rates of postoperative delirium.[106] Kristjansson et al[107] showed that depression, as assessed using the Geriatric Depression Scale, was an independent predictor of postoperative complications in a prospective study of 182 patients older than 70 years undergoing surgery for colorectal cancer (OR 3.68; 95% CI, 0.96–14.08). Relaxation techniques (eg, deep breathing, progressive muscle relaxation, and meditation), guided imagery, and problem-solving and coping strategies instituted in patients with cancer preoperatively have been shown to improve quality of life (QoL) and improve symptoms related to anxiety, depression, pain, and fatigue.[108]

Carli et al[109] performed a randomized superiority trial evaluating the effectiveness of preoperative prehabilitation versus postoperative rehabilitation in 110 frail patients (Fried frailty index ≥2) undergoing surgery for colorectal cancer. In this study, patients were provided with exercise, nutrition, and psychological interventions and had a mean age of 78 years; 79% of the patients underwent a minimally invasive surgical approach. This study reported no differences between the groups in terms of the 30-day Comprehensive Complications Index, 30-day overall and severe complications, length of hospital stay, hospital readmissions, recovery of walking capacity, and patient-reported outcome measures. This study did not support prehabilitation over rehabilitation; this may be explained, in part, by the fact that patients were treated with a protocolized, multiphase surgical pathway to decrease the stress of the perioperative period (eg, patients were treated preferentially with minimally invasive surgery and were managed with enhanced recovery pathways and intensive physical, emotional, and nutritional optimization). A secondary analysis of the dataset from this randomized trial evaluated only frail patients (Fried frailty criteria >2; n = 55) and found that patients who did not achieve a minimum walking distance of 400 m in 6 minutes had a higher 30-day complication rate than those who did (61% versus 21%; p = 0.009).[110] This implies that prehabilitation can also be used as a frailty metric and that patients who are not optimized before surgery may benefit from adapted care.

Meanwhile, the programmatic feasibility of prehabilitation has been questioned, especially given the diversity of surgical practices in the United States. Four studies (2 prospective and 2 randomized trials studying cardiac, colorectal, and orthopedic surgery patients) investigated the implementation of prehabilitation programs for frail surgical patients and measured protocol recruitment rates, patient satisfaction, adverse events, and adherence to prehabilitation regimens.[92,93,95,96] Two of the four studies demonstrated medium feasibility based on recruitment rates of 61% and 70%. However, adherence to prehabilitation

programs was found to be high in all 4 studies with rates ranging from 80% to 99%.[92,93,95,96] Three studies determined prehabilitation regimen compliance by reviewing patient diaries and 3 studies provided more objective adherence data acquired from patients' pedometers or from supervising physiotherapists or other prehabilitation team members.[93,95,96] The cost of a prehabilitation program has also been described as a potential barrier to widespread adoption. However, although frailty in surgical patients independently predicts increased postoperative hospital costs, prehabilitation programs designed specifically for frail surgical patients may demonstrate overall cost-effectiveness due to improved outcomes.[111,112]

7. Frail patients may benefit from a multidisciplinary approach to perioperative care that includes a health care provider with geriatric expertise. Grade of recommendation: strong recommendation based on low-quality evidence, 1C.

Geriatricians and practitioners with geriatrics expertise have specialized training and experience in assessing and managing geriatric syndromes (eg, dementia, delirium, propensity for falling, comorbidity, and polypharmacy) and frailty and can improve the perioperative care of patients with these conditions. However, multidisciplinary approaches engaging these providers are commonly underused due to practice patterns and the limited number of available specialists.[113] Additionally, as previously mentioned, access to resources and support may limit the individual practitioner's ability to engage a multidisciplinary team for the care of these patients. To supplement the work of geriatricians, practices can use other specialists, such as adult/geriatric nurse practitioners, social workers, nurse navigators, pharmacists, dieticians, rehabilitative medicine physicians, physical and occupational therapists, psychologists, and psychiatrists, to complete portions of the geriatric assessment and provide geriatric-related optimization.[114]

Shahrokni et al retrospectively studied the effects of geriatricians comanaging a cohort of 1020 patients who underwent cancer surgery for a variety of cancer types and required at least a 1-day hospital stay and compared this group to 872 similar patients who were treated with standard surgical service management (ie, were not comanaged by a geriatrician). This cohort study found the adjusted probability of death within 90 days in the geriatric comanaged group was less than half the rate in the standard management group (4.3% versus 8.9%; 95% CI, 2.3–6.9; $p < 0.001$). Although the 2 groups had similar complication rates, the geriatric comanaged group had greater usage of supportive care services (eg, physical therapy, speech and swallow rehabilitation, and nutrition services), which may have contributed to the decreased mortality rate in this group. In addition, although not specifically studied, the geriatricians may have addressed risk factors for geriatric-specific complications (eg, risk for delirium and falls).[115]

In a similar study, 310 patients aged ≥70 years undergoing elective colorectal surgery were assigned to usual care (107 patients) or multidisciplinary, CGA-based care (203 patients) based on their preoperative comorbidities and level of independence. Although the patients in the multidisciplinary/CGA care group had more frequent serious complications (75.9% versus 56.1%; $p < 0.001$), as would be expected based on their comorbidities, patients in this group had a lower incidence of geriatric-specific complications (delirium 11.3% versus 29.2%; $p < 0.001$ and geriatric syndromes 10.3% versus 26.2%; $p < 0.001$).[116]

A pooled review of 12 studies that used variable methodology and included patients who underwent hip fracture surgery or emergency abdominal, trauma, and gastrointestinal surgery examined surgical outcomes among older adults and showed that hospital-based geriatric comanagement leads to shorter lengths of stay and lower mortality and readmission rates.[117] Data supporting managing perioperative patients, together with geriatricians, are consistent across different surgery settings.[118]

Recognizing the importance of comprehensive geriatric surgical care, the ACS along with 50 stakeholders, including the AGS, launched the Geriatric Surgery Verification Program in 2019 to optimize perioperative management of older adults. This program emphasizes goals of care, preoperative screening and optimization for geriatric vulnerabilities, and multidisciplinary care and communication.[77,119–121] Additionally, the ACS Strong for Surgery initiative has been promoted to optimize patient health by highlighting opportunities to improve perioperative outcomes and focuses on many similar principles such as nutrition optimization, smoking cessation, screening for delirium, and prehabilitation.[122]

8. Frail older adults should be screened for social vulnerabilities and offered support. Grade of recommendation: strong recommendation based on low-quality evidence, 1C.

Social frailty, an incompletely explored concept, has been defined as a continuum of being at risk of losing or having lost resources that are needed to fulfill one or more basic social needs. Increasing age and lower levels of education are significant risk factors for developing social frailty.[123–125] Considering that older adults rely on their social relationships and environment to effectively participate in multimodality care pathways, such as those used to treat many colorectal diseases, the concept of social frailty has become increasingly relevant to this vulnerable patient population.[126] Although this topic has been widely discussed, large prospective studies evaluating this concept have not been reported.

In an observational study, Hawkins et al[127] evaluated 63 patients undergoing lower extremity amputation and showed that increased social integration (ie, the number of contacts and interactions in a patient's social network) was associated with improved postoperative function and QoL. Another prospective study of 972 consecutive patients undergoing colorectal cancer resection showed that increased social support and decreased psychological distress improved health-related QoL 1 year after surgery.[128] A systematic review of 19 randomized trials by Gardner et al[123] showed that providing practical social support was effective in enabling home-based health behavior change in frail older adults. In this study, patients with social support were more likely to have been instructed regarding positive behavioral changes and to have experienced appropriate changes in their environment; instituting positive behaviors such as using social services and following an individualized care path led to improvement in social functioning and general health.

9. Frail older adults should be managed with enhanced recovery protocols after surgery with modifications, as needed. Grade of recommendation: strong recommendation based on high-quality evidence, 1A.

Enhanced recovery protocols (ERPs) for managing patients after colorectal surgery are composed of multiple elements such as patient education, carbohydrate loading preoperatively and early feeding postoperatively, optimal fluid resuscitation, multimodality pain control, and early ambulation.[100] Although early adoption of ERPs did not universally include older patients, the principles of an ERP are generally well suited for this patient population, though pathways should be individualized to accommodate older patients' unique needs, circumstances, and resources.[129,130] For example, early removal of indwelling urinary catheters may not be uniformly appropriate in older male patients undergoing pelvic surgery with a history of prostate disease, and fluid management may need to be adjusted in the setting of chronic kidney disease and heart failure, especially in patients who received a mechanical bowel preparation. Similarly, although mechanical bowel preparation has been recommended before colorectal surgery by a number of professional societies, the evidence supporting its use is less clear in older adults.[131,132] Clinicians prescribing medications in the perioperative period should consider patients' unique medical history and current medications. Medications that meet Beers Criteria as potentially inappropriate medications for older adults should be used with caution or avoided altogether.[90] For example, care should be taken when prescribing nonsteroidal anti-inflammatory drugs to patients with renal insufficiency and when using gabapentin, which can cause dizziness, drowsiness, and confusion in older adults, especially when taken with opioids.[133] Overall, multiple studies comparing older adults treated with enhanced recovery programs or with traditional management have demonstrated that older adults benefit from ERPs, especially when protocols are adapted to patients' individual comorbidities and risk profiles.[15,134–137]

10. Minimally invasive techniques should be considered for frail older adults undergoing colorectal surgery. Grade of recommendation: strong recommendation based on moderate-quality evidence, 1B.

Minimally invasive surgical techniques for colorectal resection are safe in older patients, including those older than 85 years.[138–142] Although single-center studies have not demonstrated a significant morbidity or mortality benefit to minimally invasive surgery in this subgroup of patients specifically, a pooled analysis of 4 retrospective studies comparing patients aged >85 years who underwent open (n = 157) or laparoscopic (n = 135) surgery for colorectal cancer demonstrated significantly decreased morbidity and shorter length of hospital stay and time to resumption of a regular diet in the laparoscopic group.[141] Another pooled analysis of 11 studies (8 retrospective and 3 prospective) compared laparoscopic (n = 1066) to open colorectal resection (n = 1034) in patients older than 80 years and demonstrated significantly shorter length of hospital stay, decreased time to return of bowel function, and decreased rates of postoperative pneumonia, wound infection, and ileus in the laparoscopic group.[143] Similarly, a meta-analysis of 30 studies including 70,946 patients aged >65 years found significantly decreased mortality after laparoscopic colorectal resection compared to open surgery.[144] In terms of the benefits of laparoscopy that may pertain to older patients in particular, decreased hospital stay is independently associated with improved postoperative mobility and functional status and a greater likelihood of returning to the preoperative residence; these associations underscore the multidimensional benefits of the laparoscopic approach among older adults requiring colorectal surgery.[145–152] It is important to acknowledge that the retrospective methodology used in the majority of the studies pertaining to minimally invasive approaches among older adults has an unquantifiable degree of selection bias that may explain, to a degree, some of the reported improved outcomes attributed to laparoscopy in this setting. Another limitation of these studies is that they stratified patients by age rather than using a frailty index.

11. In older adults, patient-centered postoperative functional outcomes should be considered in addition to traditional postsurgical outcomes. Grade of recommendation: strong recommendation based on moderate-quality evidence, 1B.

Outcomes after colorectal surgery have been measured by several indicators such as length of stay, morbidity,

mortality, overall survival, disease-free survival, as well as time to first flatus or time to first oral intake. However, many of these metrics may have limited relevance to frail older adults who may be more concerned about anticipated disability and dependence than even a cancer diagnosis or limitation in life expectancy. Banks et al[153] analyzed data from a survey of 89,574 Australians (age >45 years) and found that, although 7.5% of all respondents suffered from high levels of psychological distress, those with cancer and disability attributed stress much more strongly to their level of disability than to their cancer diagnosis. Another study published by a social research institute was based on surveys completed by 1004 patients with cancer and 500 individuals without cancer and found that although longevity may be the most important priority for most patients with cancer, this notion changes for older, retired patients who rank continued independence as important as maintaining health.[154]

Comprehensive colorectal surgery–related care for older patients should address functional recovery and patient-reported outcomes in addition to more conventional outcomes.[155] Functional recovery may incorporate organ-specific postoperative outcomes and patients' ability to regain preoperative functional status. Loss of independence, or an increase in support required by patients after hospital discharge, is an example of a relevant functional recovery metric used to evaluate frail older patients. Regaining independence, typically measured as a composite outcome, includes an assessment of cognition and nutritional status and the ability to perform routine ADLs and to walk proficiently.[74] Although a variety of instruments have been proposed to evaluate these kinds of domains, the most compelling literature uses the ADL, Mini-Cog, and Timed Up and Go/6-minute walk distance scores.[23,38,84,156–159] De Roo et al, in a retrospective matched cohort study, highlighted the importance of analyzing less conventional outcomes like functional decline, which was defined as an increase in the number of ADLs requiring assistance after surgery. In this study, 289 patients who underwent colorectal surgery and were older than 65 years were compared to 867 control patients who did not undergo surgery.[160] De Roo et al found that patients who underwent surgery and had a complication (90 patients, 31% of the surgical cohort) had a higher likelihood of functional decline (OR 2.96; 95% CI, 1.70–5.14) compared to controls and those who did not have a surgical complication (OR 1.82; 95% CI, 1.22–2.71).[160]

Organ-specific functional recovery outcomes, especially relevant to patients undergoing treatment for rectal cancer, typically incorporate an evaluation of urinary, sexual, and bowel function. In addition to low anterior resection syndrome and fecal incontinence, less commonly reported outcomes such as the rate of diverting loop ileostomy closure after sphincter-saving surgery are important and relevant metrics of functional recovery. For instance, multicenter data from the English National Health Service National Bowel Cancer Audit showed that 67.7% of patients aged 71 to 80 years and only 59.8% of patients older than 80 years underwent ileostomy closure after proctectomy for rectal cancer.[161]

Patient-reported outcomes (PROs), despite their complexity, can be captured by integrating smart devices into electronic medical record systems and using a variety of programs to collect data.[162,163] Tools to measure QoL in frail older patients with colorectal cancer may include a variety of European Organisation for Research and Treatment of Cancer (EORTC) QoL questionnaires, as the study cohorts used to validate these tools included older patients, and forms are available specifically for older patients (eg, EORTC QLC-CR29, EORTC QLQ-C30, and EORTC QLQLMC).[164] The University of California, Los Angeles 3-Item Loneliness Scale, evaluating how often patients feel they lack companionship or feel left out or isolated from others, was also reported to be useful in assessing PROs in frail individuals.[165]

Data suggest that in addition to PROs being patient-centered, pairing PROs with a clinical alert system and symptom-targeted interventions in routine practice can improve overall survival. A randomized controlled trial of 766 patients with a median age of 61 years receiving chemotherapy for advanced cancers (including breast, lung, genitourinary, and gynecologic primaries) assigned patients to either weekly monitoring of PROs with an online tool, the Symptom Tracking and Reporting system, or usual care. During the course of the study, the Symptom Tracking and Reporting program alerted clinicians when patients in the PRO group reported a severe or worsening symptom. At a median follow-up of 7 years, a statistically significant survival advantage in the intervention group was detected compared to the usual care group (median overall survival 31.2 months [95% CI, 24.5–39.6] versus 26.0 months [95% CI, 22.1–30.9]).[166]

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