Frailty Screening and Interventions

Considerations for Clinical Practice

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KEYWORDS

• Frailty • Clinical • Assessment • Screening • Prevention • Intervention

KEY POINTS

- Frailty is a recognized health problem among older adults and vulnerable populations that increases the risk of adverse outcomes, including falls, hospitalization, and death.
- Multiple instruments exist to screen for frailty in clinical settings and more research is needed to validate these instruments beyond their predictive value.
- Frailty interventions include exercises, nutrition, and multicomponent strategies, though findings to date have been mixed.
- Preventing frailty is an important area for further research.

INTRODUCTION TO FRAILTY

Over the past 100 years, advances in medicine and public health have led to a nearly 2-fold increase in average lifespan.[1] Approximately 8.5% of the global population is 65 years or older, and this will increase to an estimated 16.7% by 2050.[2] Many health problems are related to aging, including chronic diseases, infections, disability, falls, and cognitive disorders.[2] There also seems to be a trend for increased vulnerability to health risks and poor outcomes as humans age.

Frailty has been viewed as a cornerstone of geriatric medicine and a platform of biological vulnerability to a host of other geriatric syndromes and adverse health outcomes.[3] Using a common frailty assessment instrument, an estimated 15% of noninstitutionalized adults in the United States are frail,[4] and global estimates of frailty range from 3.5% to 27.3%.[5] Clinical perspectives on the definition of frailty were initially broad; in the 1980s, chronologic age, care requirements, and disability were used

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synonymously with frailty.[6] In the following decade, clinical definitions became more refined though still included a wide range of domains.[7] The topic of frailty began receiving serious attention in the medical literature in the 1990s, as a reflection of the unexplained vulnerable state of older patients commonly observed by health care providers. Several key theoretic papers on frailty emerged during this time,[8–10] as did early operational definitions.[7] In 1992, Buchner and Wagner[8] discussed 3 components central to frailty: neurologic control, mechanical performance, and energy metabolism. In the same year, Fried,[9] in summarizing a workshop on the physiologic basis of frailty, described the syndromic nature of frailty with specific components, including weakness, fear of falling, and weight loss. This conference also distinguished frailty and disability as separate entities.

Fried and Walston[3] proposed the frailty phenotype with 5 components interlinked to form a cycle of frailty: weakness, slowness, exhaustion, low activity, and weight loss. Fried and colleagues[11] defined frailty "as a biologic syndrome of decreased reserve and resistance to stressors, resulting from cumulative declines across multiple physiologic systems, and causing vulnerability to adverse outcomes," and operationalized it using the frailty phenotype. The deficit accumulation approach emerged during the same period, which included counts of diseases, conditions, and comorbidities across many domains to determine frailty status.[12] More recently, a geriatric clinic in France has implemented a frailty screening tool based on the frailty phenotype that includes social and cognitive factors, along with physical components.[13] In 2013, members of a consensus group reached agreement on the following definition of frailty, "A medical syndrome with multiple causes and contributors that is characterized by diminished strength, endurance, and reduced physiologic function that increases an individual's vulnerability for developing increased dependency and/or death."[14]

Frailty Screening Instruments

Over the past 20 years, dozens, if not hundreds, of frailty assessment instruments have been developed and in part validated by showing the association between frailty and adverse health outcomes in older adults.[15] Most of these instruments are either (1) frailty phenotype instruments, in which motor and activity measures predominate and lead to an aggregate score that spans from robust to frail; or (2) frailty index instruments, in which comorbidities, social factors, psychological conditions, and function and cognitive decline measures are incorporated into an index in which the higher the number of conditions, the higher the frailty score.[16] Many frailty instruments are useful for identifying individuals at high risk for adverse outcomes but less so at informing clinical practice or the development of clinical interventions to prevent or treat frailty. Additionally, agreement between these instruments has been shown to vary greatly.[17] Maintaining validity in terms of ensuring that instruments are measuring their intended frailty-related constructs is another important consideration.[18–20]

Because short and simple instruments are most feasible in clinical practice, several quick screening tools have been developed and validated.[14] These include the Clinical Frailty Scale (CFS)[21] and the Fatigue, Resistance, Ambulation, Illnesses, and Loss of Weight (FRAIL) scale.[22] The CFS is based on clinical observation by the physician and assigns a score between 1 and 7 based on activity, function, and disability. The FRAIL scale is based on self-reported fatigue, mobility, strength, and weight loss, as well as a tally of the number of comorbidities. These 2 scales are especially relevant in clinical practice and require only a few minutes. The frailty phenotype and the Gérontopôle screening tool have also been recommended for screening purposes,[14] along with gait speed, as a single screening measure.[23]

Published best practice guidelines for recognizing and managing frailty in older adults in the United Kingdom highlighted 3 measures for rapid identification of frailty: gait speed less than 0.8 m/s, timed up-and-go test greater than 10s, and a score of greater than or equal to 3 on the Program of Research to Integrate Services for the Maintenance of Autonomy questionnaire.[24] Common clinical presentations, such as falls, delirium, and sudden immobility, may also indicate the presence of frailty in older adults.[24] Though quick identification tools are important in the clinical setting, caution must be advised because instruments are not necessarily interchangeable given the different items measured.[19] Also, there is frequent lack of agreement in identifying persons who are frail versus nonfrail persons when using these different assessment instruments.[24] **Table 1** provides a summary of selected tools that can be used for frailty screening.

SCREENING FOR FRAILTY IN THE CLINICAL SETTING

Frailty is associated with greater prevalence of adverse health outcomes, including mortality, disability, worsening mobility, falls, and hospitalization in the US population[4]; and it is predictive of these outcomes in epidemiologic cohorts.[11,20] Frailty, therefore, may be useful for risk prediction and decision-making in clinical settings. In a literature review that cataloged frailty instruments and their uses, however, the use of frailty assessment for clinical decision-making with regard to care delivery and management was found to be rare.[15] This low level of utilization in clinical decision making may reflect (1) lack of evidence and guidance on how to incorporate frailty status information within specific clinical settings and (2) confusion over which frailty instrument to select in a given specialty. In the following sections, studies of the use of frailty assessment in clinical settings are reviewed, the potential of frailty to provide value-added utility to clinical specialties is explored, and ongoing challenges and opportunities identified.

Screening for Frailty in General Clinical Practice

Despite disagreement on the best methodology to identify frailty in older adults, there has been an emerging trend toward the recognition of potential importance of screening for frailty to assist in general decision-making.[14,22,24] For example, screening for frailty has been recommended as an easy way to identify those older adults who would most benefit from a comprehensive geriatric assessment (CGA).[24] Recently, other guidelines have been proposed for older adults with diabetes in which glycemic targets of treatment differ depending on frailty status, with less stringent glycemic control recommended for frail older adults, whose compromised physiologic reserves may increase the risk of treatment-related adverse outcomes, such as hypoglycemia events.[25] Another example from the primary care setting includes ongoing research to ascertain whether or not frailty status should influence blood pressure target levels given that potential benefits may be offset by potential side effects of pharmacotherapy.[26,27]

Screening for Frailty in Subspecialty Populations

To date, frailty assessment has been used in a variety of clinical specialties for the identification of those at highest risk for adverse outcomes and for risk stratification to assist in clinical decision making.[28] **Table 2** is a summary from among a selected group of medical specialties: cardiology, infectious diseases, nephrology, oncology, and surgery.

Table 1
Selected instruments for frailty screening

Instrument	Components	Scoring
CFS[14,21]	Clinical judgment, ranging from very fit to severely frail: 1 = very fit; 2 = well; 3 = well, with treated comorbid disease; 4 = apparently vulnerable; 5 = mildly frail (some dependence on others for instrumental activities of daily living); 6 = moderately frail (help needed with instrumental and noninstrumental activities of daily living); 7 = severely frail (total dependence on others for activities of daily living or terminally ill)	Physician assigns score of 1–7 based on clinical judgment Physicians making the initial assessment given access to diagnoses and assessments related to these variables and other measures of comorbidity, function, and associated features that inform clinical judgments about the severity of frailty A secondary review and scoring is performed by a multidisciplinary team
FRAIL Scale[14,22]	Self-reported fatigue, resistance (ability to climb a single flight of stairs), ambulation (ability to walk 1 block), illnesses (more than 5), loss of weight (more than 5%)	Score range 0–5 No frailty = 0 deficits Intermediate frailty = 1 or 2 deficits Frailty = 3 or more deficits
Frailty Phenotype[11,14]	5 criteria: weight loss, measured weakness, self-reported exhaustion, measured slowness, low activity; questionnaire	Score range 0–5 Frail: $\geq$3 criteria present Intermediate or prefrail: 1 or 2 criteria present Robust or nonfrail: 0 criteria present
Gait Speed (as a single measure)[23,24]	Measured gait speed over 4 m	Gait speed <0.8 m/s is cutpoint for increased risk of adverse health outcomes Gait speed <0.2 m/s is cutpoint for extreme frailty

Gérontopôle Frailty Screening Tool[13,14]	6 questions to be answered by the practitioner or clinician: (1) whether the patient lives alone, (2) whether the patient has lost weight, (3) whether the patient has felt more tired, (4) whether the patient has memory problems, (5) whether the patient has found it difficult to get around, and (6) whether the patient has a slow gait (<1 m/s)	If the practitioner or clinician answer yes to any 1 of the 6 questions, the screening questionnaire asks for their clinical judgment on whether the patient is frail: if yes, a follow-up question is to be completed about to whether the patient is willing to be fully evaluated for frailty
PRISMA Questionnaire[24,56]	7 yes-or-no self-reported questions about: (1) age, (2) sex, (3) health problems that require a limit on activities, (4) help needed from someone regularly, (5) health problems that require one to stay at home, (6) having someone to count on if needed, and (7) regular use of an assistive device for walking	Answering yes to 3 of more of the 7 questions = potential disabilities or frailty
Timed Up-and-Go Test[24,57]	Measures of functional mobility (chair stair, 10-foot walk, and return the chair)	Frail = taking >10 s to complete the test

Abbreviation: PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Table 2
Frailty assessment in clinical research studies among medical specialties

Specialty	Frailty Prevalence	Instruments Used	Findings
Cardiology	10% to 60% among older adults with cardiovascular disease (CVD)[58]	Gait speed as a single measure, the frailty phenotype, and the CFS[58]	• 2-fold increase in mortality for frail older CVD patients across a broad spectrum of cardiovascular pathologic conditions and therapies[58] • Used as a component of patient selection for invasive and potentially high-risk therapies[59]
Infectious disease: human immunodeficiency virus (HIV)	15% among HIV-infected drug users; 10% among persons with AIDS-defining illness, after initiating combination antiretroviral therapy (cART)[60]	Modified version of the frailty phenotypes, the frailty index, and the Veterans Aging Cohort Study index[61]	• 3-fold increase in mortality for frail HIV-infected adults, independent of comorbidity and HIV disease stage[60] • Worse prognosis (AIDS, death) for HIV-infected adults with frailty before initiating cART than for those without pre-cART frailty[62]
Nephrology	Average of 36.8% among middle-aged to older adults with end-stage renal disease (ESRD)[63]	Modified version of the frailty phenotype[63]	• Among patients with ESRD, frailty is associated with falls,[64] mortality, hospitalization,[65] and health-related quality of life[66] • Frailty information may help to guide which ESRD patients are determined to be most suitable for kidney transplant[67]

Oncology	42% median (range 6%–86%) among older cancer patients[68]	Physical functional performance and the Vulnerable Elders Survey used to screen for patients who would most benefit from a full CGA[68,69]	• Frailty is predictive of all-cause and postoperative mortality, chemotherapy intolerance, and postoperative complications in cancer patients[68] • Routine frailty (and fitness) assessments can help guide treatment[68] and frailty is associated with cancer treatment recommendations[70]
Surgery	41.8%–50.3% among older patients undergoing elective cardiac and noncardiac surgery[71]	Frailty phenotype, Deficit Accumulation Index, and Edmonton Frail Scale[71,72]	• Utility of frailty has been proposed for several purposes: preoperative risk assessment, trauma triage, prehabilitation to modify risk, tailored anesthesia administration, team-based care options, delirium prevention, and decision-making for palliative care[73] • In preoperative risk assessment, recent studies have shown that frailty predicts postoperative outcomes in older patients receiving elective surgery or kidney transplant (regarded as internal stressors), even after accounting for the conventional measures used in preoperative risk assessment[72,74,75]

Challenges and Emerging Areas in Screening for Frailty

Despite calls to intensify efforts to screen for frailty among older adults,[14,29] a recognized need exists for further research on the contribution of frailty assessment to patient care and on best practices for managing frail patients. A study by Sourial and colleagues[30] found a significant but modest added predictive value of frailty markers for disability, beyond the common clinical markers of age, sex, and chronic diseases. Therefore, before clinical frailty screening can be implemented without reservation, more studies examining the net contribution of frailty screening to risk prediction in different settings and populations, and for both clinical and patient-centered outcomes, are needed.

A notable emerging area for frailty screening is the use of biomarkers to identify frail older adults.[31–33] However, several issues remain; a consensus effort to reach agreement on a definition of frailty for clinical uses found a significant disagreement on the selection of specific biomarkers for frailty, especially laboratory-based markers.[34] One area of agreement is that no single biomarker may be adequate for frailty prediction or diagnosis.[34] Currently, efforts are underway to develop methods for identifying multivariate approaches to biomarker models for frailty.[35]

INTERVENTIONS FOR FRAILTY AND PREVENTING THE DEVELOPMENT OF FRAILTY

Frailty Interventions

Interventions for frailty have been proposed along a spectrum of frail health (**Fig. 1**). Four major types of intervention to improve health outcomes of frail individuals or, most recently, combat frailty itself have been attempted: exercises, nutritional intervention, multicomponent interventions, and individually tailored geriatric care models. Most of the exercise interventions focused on flexibility, balance, resistance, and endurance training. The results varied by the type, duration, and modality of interventions, gender, residential status, study outcomes, and frailty assessment tools used.[36] The oldest old, frail women, or those living in long-term care facilities tend to benefit the most.[36] A progressive exercise program beginning with flexibility and balancing training, followed by resistance and endurance training has shown to be effective in improving physical function; and the gradual increase of exercise intensity may be particularly appealing to sedentary frail older adults with safety concerns and difficulty with compliance. In fact, the most recent updated American College of Sports Medicine guidelines[37] recommend that resistance and/or balance training should precede aerobic training for this population.

Very few studies have directly evaluated the impact of exercise intervention on frailty itself, other than its components or physical function in general.[38] The Lifestyle Interventions and Independence for Elders pilot (LIFE-P) study reported that a 12-month physical activity intervention was associated with 9% lower frailty prevalence, and significantly greater reduction in the mean number of frailty criteria for blacks and those with frailty at baseline relative to a successful aging education group. However, the trends observed in the LIFE-P were primarily driven by intervention-related change in sedentary behavior suggest that interventions designed to target the phenotypic components of frailty, such as muscle weakness and inactivity, may not be sufficient for addressing or alleviating the root causes of frailty.

In the domain of nutrition, a recent review by Manal and colleagues[39] summarized findings of 4 types of intervention: specific nutritional supplement formula; daily food fortification with protein supplement; nutritional education and counseling; and supplementation of micronutrients, including vitamin D, omega-3 fatty acids, and multivitamins. The results have been mixed due to the type and duration of nutrition

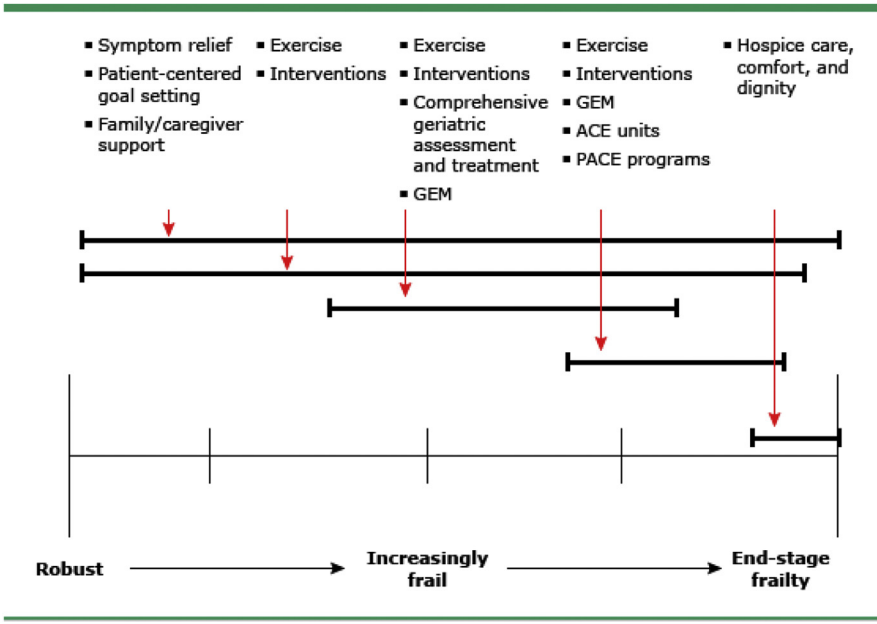

Fig. 1. Potential interventions along the spectrum of frailty in older adults. (*Reproduced with permission from* Walston JD. Frailty. In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed August 22, 2017.) Copyright © 2017 UpToDate, Inc. For more information visit www.uptodate.com. and *Modified from* Walston JD, Fried LP. Frailty and its implications for care. In: Morrison RS, Meire DE, editors. Geriatric palliative care. New York: Oxford University Press; 2003. p. 101; with permission.)

intervention and nutritional status before the intervention. For example, food fortification,[40] multinutrient supplementation,[41] and vitamin D[42] showed no significant effect, whereas other studies of nutritional supplementation reported reversal of weight loss and improved nutritional status but not functional outcomes such as grip strength. The latter findings led to the hypothesis that nutritional intervention alone may be too little, and too late, to reverse the process of decreased muscle strength and functional decline.[43] Nutritional advice and counseling[44,45] improved frailty status only among older adults at risk for malnutrition.[46]

Because of the likely multifactorial etiologic factors underlying frailty, interventions combining exercise, behavioral therapy, nutrition, and cognitive training have also been tested. For example, the combination of exercise and nutrition intervention resulted in frailty status improvement[47–49] or reduction in prefrailty-to-frailty transition.[50] Most recently, a 6-month trial combining nutritional supplementation, physical training, and cognitive training was found to improve frailty status in groups receiving each treatment alone, as well as in the group receiving all 3, and the improvement persisted 6 months after treatment cessation.[51]

Besides efforts to identify a specific intervention or combinations of intervention that are uniformly efficacious for all frail older adults, individually tailored interventions based on impairments identified by the CGA have received growing attention. Although evidence on the effectiveness of CGA in preventing functional decline is mixed in the general population, some have argued that the value of CGA could be greater in frail older adults at high risk for functional decline. Consistent with this hypothesis, a 6-month prehabilitation program for the prevention of functional decline

among physically frail, community-dwelling older adults reduced activities of daily living disability by one-third and shortened the average length of nursing home stay by 1 week after 1-year of individualized care based on CGA.[52] Rather than using frailty assessment for risk stratification before CGA, a few studies have also tried to directly intervene on frailty and its components guided by CGA.[53–55] Among them, an individually tailored multifactorial intervention delivered by a multidisciplinary team consisting of a physiotherapist, geriatrician, rehabilitation physician, nurse, and dietician was found to improve frailty status and helped maintain physical function in frail older adults.[54,55]

Preventing the Development of Frailty

Recommendations to prevent frailty have largely focused on addressing proposed drivers of functional decline: lack of regular exercise, malnutrition, cognitive impairments, and the development of chronic diseases. Buchner and Wagner[8] outlined key considerations for the prevention of frailty that include monitoring physiologic reserve, performing regular exercise to prevent chronic loss, preventing acute and subacute loss (ie, vaccinations), increasing physiologic reserve before anticipated loss (prehabilitation before an elective hospitalization), and removing obstacles to recovery (using geriatric evaluation and management). As detailed in the previous section, several studies have attempted to intervene on factors that may lead to frailty and its clinical presentation.

SUMMARY

Screening for frailty in clinical settings sits at an interesting crossroads. In some arenas, frailty assessments are already being carried out routinely in geriatric clinics and in certain medical specialties. Notably, in these specialty populations, frailty has shown promising utility in identifying patients who may have poor outcomes following treatment or who may require prehabilitation before a procedure. On the other hand, cautions have been raised against rushing to implement frailty in general clinical settings due to (1) the lack of an agreed-on operational definition of frailty, which, in turn, may results in misclassification; (2) the need for further research on its added clinical value; and (3) the need for evidence-based guidelines on how to manage, treat, and in some cases reverse frailty in patients. As the world's population of older adults increases rapidly, the benefits and ongoing challenges related to frailty assessment will become a priority for more and more health care providers.

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