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Patient Frailty: Key Considerations, Definitions and Practical Implications

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Abstract

By 2020, the elderly (≥ 65 -year-old) world population is projected to exceed one billion individuals. This demographic megatrend has brought topics such as physiological age and frailty to the forefront of medical research efforts around the globe. The concept of frailty has evolved significantly since the mid-twentieth century. The outdated stereotype of a “thin, stooped, slow octogenarian” has transitioned to a more scientific and objective understanding of the problem. Still, a comprehensive and concise definition of “frailty” remains elusive. Until such a definition is firmly established and universally agreed upon, clinicians continue to rely on the somewhat subjective conceptual framework of today. In this chapter, the authors review key issues pertaining to clinical management of frail patients, including diagnosis/identification, preventive strategies, therapeutic approaches, and common pitfalls. The relationship between frailty, various domains of life, and functional status is also discussed. Finally, we will touch upon the concepts of end-of-life and goals of care, focusing on their relationship to frailty.

Keywords: Frailty, Chronological age, Physiological age, Aging process, Objective assessment

1. Introduction

The world population is projected to exceed 7.5 billion in 2020, with one billion to reach or exceed 65 years of age [1, 2]. This demographic change has made frailty the focus of consid-

erable scientific research, generating increasing interest during the past two decades [3–5]. As more people make the transition across the life span [6], better understanding of the corresponding changes and considerations is required. The concept of frailty has evolved substantially over the past five decades. The stereotypical description of a “thin, stooped, slow octogenarian” [7], although very vivid and generally reflective of a frail patient, has not been matched with an equally concise definition. A comprehensive and objective definition of frailty is needed in order to effectively diagnose, research, and improve the understanding of this condition. Until such definition is universally agreed upon, clinicians will have to do their best diagnosing frailty within the currently established framework. This chapter reviews some of the key issues that practitioners may encounter when treating frail patients, including its identification, preventive, and therapeutic options, as well as common pitfalls. We also discuss the relationship between frailty and various domains of life and functional status, with a brief overview of recent trends in the area of goals of care and end-of-life considerations.

2. What is frailty?

Frailty is a multifactorial phenomenon (**Figure 1**) that affects multiple domains of life (**Table 1**). Our understanding of frailty has advanced significantly since the late 1960s, when frail patients were described as “...confused, restless, incontinent... [and] ...old” [8]. Twenty years later, the frail population was described as “...elderly people with multiple problems...” [9]. Today’s definitions are more dynamic, elegant, and refined, with two main models of frailty dominating the recent literature [10, 11]. The “phenotype model” of frailty, described as “...a biologic syndrome of decreased reserve and impaired resistance to stressors, resulting from cumulative declines across multiple physiological systems, and causing vulnerability to

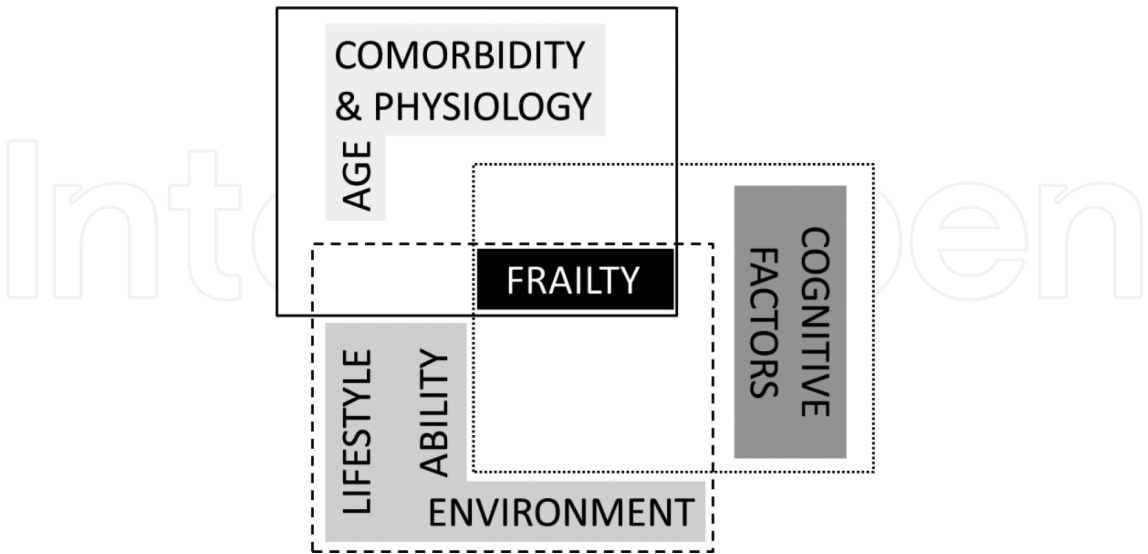


Figure 1. Venn diagram showing the overlap of different domains, all of which contribute to the eventual development and progression of frailty.

adverse outcomes...” was proposed by Fried et al. [12]. This model requires the presence of three out of the following five phenotypic criteria in order to define frailty: (a) low grip strength; (b) low/decreased energy levels; (c) slow walking speed; (d) low physical activity; and/or (e) unintentional weight loss [12]. The second model, developed by Rockwood et al. takes into account “assets” and “deficits” which either aid or are detrimental to a patient’s independent functioning [13, 14]. This model is closely tied to various indices currently used as tools for assessing the degree of frailty in patients.

Impairment	Activities affected	Risks
Ambulatory dysfunction	Driving	Elder abuse/neglect
Cognitive decline	Social interaction	Financial theft
Impaired judgment	General functional level	Depression
Medication side effects	Access to services/care	Suicide
Impairment in eyesight		Lack of understanding
Impairment in hearing		
Education/prevention		
Holistic assessment of the individual	Realistic discussions about specific risks	
Shared decision-making	Advance directive	
Established power-of-attorney	Durable power of attorney	
Do not wait for a crisis	Review of medication profile	
Screening for depression		
Resources		
Family and immediate social network	Faith community	
Adult day care communities	Area association on aging	
Alzheimer’s association	Palliative care programs	
Home health programs		

Compiled with permission from Keller et al. (1999). *J Am Geriatr Soc* 47(11):1319–25; McGadney BF. (1995) *African American Research Perspectives* 2(1):34; Panza et al. (2010). *Am J Geriatr Psychiatry* 18(2):98–116; Schulman-Green et al. (2006). *Patient Education & Counseling* 63(1):145–151; Walsh F. (2012). *Annual Review of Gerontology & Geriatrics* 32(1):151–172.

Table 1. Conditions that may lead to the development of frailty while also placing the individuals at various types of associated risk. An outline of educational and community resources is provided as well.

Boers et al. [15] argue that the existing definitions of frailty are limited because the word “syndrome” should be reserved for defining phenotype characteristics that constitute a set of symptoms and signs representing a health condition. They also argue that the classic World Health Organization definition of health is outdated and that a new, more dynamic concept of health as “...the resilience or capacity to cope, and to maintain and restore one’s integrity, equilibrium, and sense of well-being in three domains: physical, mental, and social...” opens

the door to simply defining frailty as “the weakening of health” [15–17]. Currently, there is insufficient evidence to accept a single definition of frailty [14], and the ongoing debate highlights the need for a consensus [18].

Using the definition of frailty as a “...decreased reserve and resistance to stressors...” [19] highlights the importance of individualized, careful approach when weighing risks and benefits of various interventions [20–22]. In this context, an “intervention” could range from an elective surgical procedure to initial administration of an oral hypoglycemic agent in a diabetic patient. For example, one prospective study found that patients deemed as “intermediately frail” or “frail” were more likely to experience postoperative complications [23]. Some authors suggest that frailty should be routinely measured as part of the perioperative patient risk assessment in older individuals, pointing out that most current surgical risk scores do not adequately take frailty into consideration [24]. In one study, patients deemed fit by Comprehensive Geriatric Assessment (CGA [25]) with diffuse large-cell lymphoma had better survival and chemotherapy response rates when compared to their “more frail” counterparts [26]. One systematic review suggested that more than half of older cancer patients in the United Kingdom were “pre-frail” or “frail”, and identified that these groups were at increased risk of all-cause mortality, chemotherapy intolerance, and postoperative complications [27, 28]. Frailty may also compound the problem of pre-existing medical conditions, mainly via multiple “feedback” mechanisms, where frailty facilitates the downward clinical spiral [29]. For example, recurrent episodes of hypoglycemia may occur unnoticed due to the impaired autonomic response in the frail, elderly diabetic patient. This, in turn, may result in repeated subclinical central nervous system insults, which may lead to worsening cognitive dysfunction (e.g., progressive dementia) and physical frailty [29]. Frailty may also be associated with greater incidence of cardiovascular death, myocardial infarction, and stroke [30]. Taken together, the above examples may be applicable across various clinical settings where disease, treatment, and frailty dynamically interact [31, 32]. Evidence also shows that although patients considered “pre-frail” and “frail” had greater morbidity and mortality when compared to their “robust” counterparts, the median age in the three frailty groups was similar, supporting the notion that both chronological *and* physiological age play a role in the “frailty equation” [30, 33].

Frailty is also an independent predictor of falls, delirium, disability, and hospitalization [34]. Better understanding of frailty, coupled with the ability to identify it, is critical to our ability to control, and possibly modulate, associated physiological and cognitive changes. This not only has significant implications for patients and their quality of life but also presents an opportunity to reduce health care-associated costs of frailty by focusing on effective preventive strategies [35–37]. Despite the growing focus around frailty, screening and risk stratification are still limited, the CGA is underutilized, and the involvement of geriatric specialists is far from routine [38]. In summary, there is need for better identification of frail patients in order to optimize their clinical management and adequately counsel patients regarding risks and benefits of any proposed treatments [39].

3. Frailty: identification and assessment

The gold standard for identifying frail individuals is the Comprehensive Geriatric Assessment (CGA) [40]. The CGA requires a team of doctors, nurses, and therapists to jointly establish a patient's matrix of bio-psycho-social needs [41, 42]. In studies, CGA has been closely associated with the Canadian Study of Health and Aging (CSHA) frailty index [43, 44]. Due to the amount of effort required to complete a CGA for all at-risk patients, it is challenging for the non-geriatric practitioner to effectively mobilize the required resources. Consequently, extensive research has been performed to find a simpler method of identifying and quantifying frailty.

Another model outlines a phenotypic definition of frailty [12, 45]. This model, proposed by Fried, is relatively simple and requires little modification to the routine, standard-of-care medical practice when collecting and assessing required variables. However, its translation into clinical practice may be challenging [40]. Critics of Fried's definition argue that it does not sufficiently address cognitive aspects of frailty. Some propose that adding a mini mental state exam (MMSE) and the Isaacs Set test may improve the predictive validity of the combined screening tests [46]. It has been shown that targeted questionnaires can be very effective in evaluating frailty in the elderly population, especially when looking at aspects of "psycho-physical state" and frailty [47]. Such questionnaires may be useful in identifying and quantifying various cognitive and mood aspects of frailty.

One systematic review showed that the most sensitive screening tools used to measure frailty are gait speed <0.8 m/s, timed-up-and-go-test of >10 s, and the PRISMA 7 score of ≥ 3 [48]. These criteria had sensitivities of 0.99, 0.93, and 0.83 and specificities of 0.64, 0.62, and 0.83, respectively [48]. Of importance, most of the research on screening tools originates from the outpatient setting, with relatively less experience regarding screening for frailty in the hospital [49]. In summary, if a CGA is unavailable, the practitioner should utilize multi-modality, phenotype-based approaches that incorporate multiple, complementary screening tools outlined above.

4. Frailty versus comorbidities: similar but different

The concept of frailty rests on the idea that declining physiological reserve and function leads to susceptibility toward adverse outcomes and poor resolution of acute medical events and injuries [40]. At this point, it is important to discuss the relationship between frailty and comorbidity burden. Although it is intuitive that decline in physiological reserve is related to age, frailty measurements are independent of chronological age. Chronological age, frailty, and the increased prevalence of chronic health conditions are inextricably linked. Approximately 25–50% of the population >85 years of age can be characterized as being frail or vulnerable to adverse outcomes after an exposure to acute stress [40, 50, 51]. However, chronological age does not directly correlate with frailty, which is where comorbidity assessment may provide valuable quantitative insight as a co-variate.

There are several comorbidity indices, each of which offers slightly different perspective on the patient's comorbidity burden. Although a complete discussion of instruments used to

quantify comorbidities is beyond the scope of this chapter, we will provide an overview of the topic. The Charlson Comorbidity Index (CCI) considers a pre-defined, weighted set of medical diagnoses and has been shown to predict healthcare resource utilization, clinical risk stratification, and mortality [52, 53]. The Elixhauser index considers variable characteristics of medical conditions across different patient populations, using a set of 30 comorbidities to predict outcomes such as length of stay, hospital charges, and mortality [54]. One Elixhauser index derivative consists of a simplified score with good utility in estimating the effect of comorbidities on clinical outcomes [55].

The Comorbidity-Polypharmacy Score (CPS) combines comorbidities and polypharmacy into a simple, yet potentially accurate measurement of frailty [33]. It is a sum of all pre-existing conditions and medications [56]. CPS weighs the “severity” of comorbidities based on the number of medications necessary to treat each respective chronic condition [33, 57]. In clinical studies, CPS correlated with morbidity, mortality, readmissions, post-emergency department (ED) triage, and the need for discharge to skilled nursing/extended care facility [33, 56–60]. CPS may thus constitute the “missing link” that uses the “intensity” of polypharmacy to connect the concepts of frailty and comorbidity.

5. Frailty: multidisciplinary and interdisciplinary approaches

Frailty is inextricably associated with several determinants of a patient’s overall health status, including genetic predispositions, environmental factors, and comorbid conditions [61, 62, 40]. It naturally follows that the optimal approach to caring for frail patients is a collaborative one [63]. Consequently, treatment teams should include participants from various specialties, including generalists and specialists, smoking cessation counselors, social workers, mental health professionals, physical and occupational therapists, nutrition experts, wound care specialist, and nurses [64–68]. Major themes involved in the overall “frailty equation” are shown in **Figure 2**.

A collaborative approach to identification, prevention, and management of frailty can be facilitated by establishing areas of subspecialty within existing medical disciplines that focus on the care of the elderly and the frail [69, 70]. For example, during exploratory work on the concept of geriatric surgery, it was emphasized that this new surgical subspecialty should have multidisciplinary character [71]. Among other recommendations was the role of the geriatric service in screening, identifying, and managing the frail patient. Multidisciplinary teams should consist of surgeons from various subspecialties as well as representatives from medical specialties (e.g., geriatric medicine, geriatric psychiatry, wound care, palliative care, physical medicine, and rehabilitation) [71].

Management of frailty includes the coupling of effective prevention with directed therapeutic approaches [72]. In one study, 188 frail people living at home were randomized to undergo either physical therapy-based intervention or an educational program (control group) [73]. The study showed improved functional outcomes in the intervention group. In addition, inactivity and muscle weakness have been found to be significantly associated with frailty [74].

In another study, there was a strong relationship between daily sedentary time and development of physical frailty [75]. This highlights the importance of physical and occupational therapy as critical components of the multidisciplinary approach to the management and prevention of frailty. It also supports the inclusion of social interventions to ensure that elderly patients stay active by participating in various activities or community work.

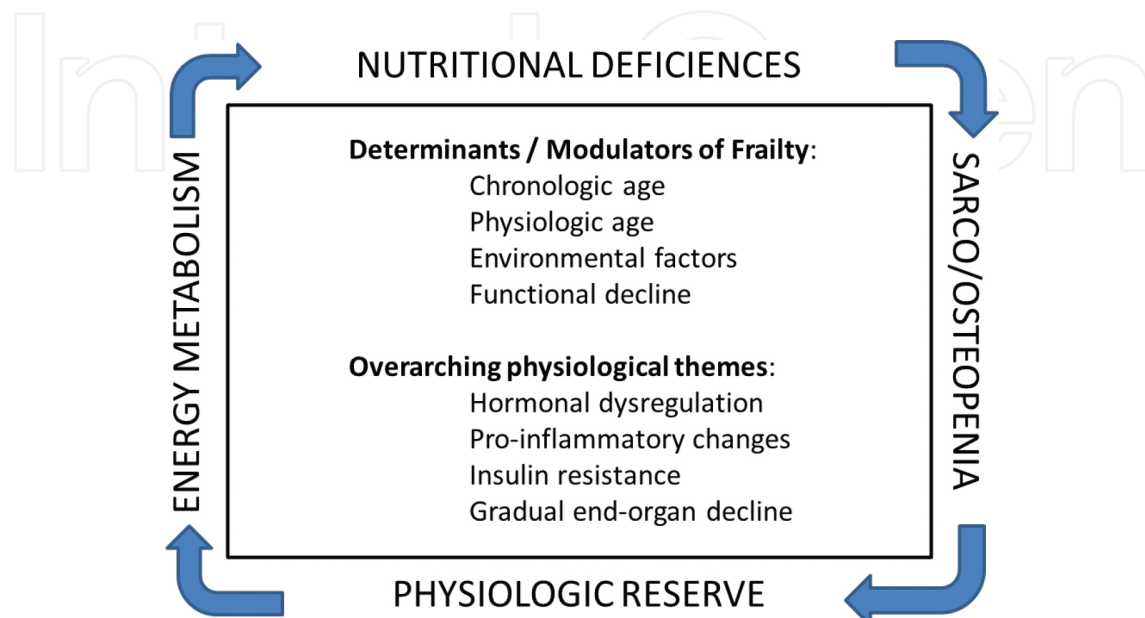


Figure 2. Major themes and manifestations associated with the development and progression of frailty. Modified with permission from McDermid et al. [124].

Major components of the frailty syndrome include weight loss [76], sarcopenia [77], and osteopenia [78, 79]. Consequently, adequate supplementation of protein, calories, and essential nutrients is important in the treatment and prevention of frailty [77]. At the same time, frailty can exist in the morbidly obese, corroborating the need for the multidisciplinary team approach [80]. In the context of osteopenia, it has been demonstrated that a simple intervention, such as vitamin D supplementation, has been shown to be beneficial in reducing hip fractures and associated complications in the frail, elderly patient [77, 81–84].

One randomized controlled trial evaluated the effects of nutritional, cognitive, physical, and combined interventions in frail, older adults. Combined approach utilizing physical exercise, nutritional supplementation, and cognitive training was effective in reducing frailty [85]. For some, advanced frailty is synonymous with the commonly used term, “failure to thrive”. The main purpose of multi-pronged approaches is to prevent or delay the progression of frailty and to slow down the associated functional decline.

Polypharmacy has been proposed as an indirect reflection of frailty, especially when coupled with measures of comorbidity [33, 86, 58]. Significant correlations were found between CPS (Comorbidity-Polypharmacy Score) and a variety of clinical endpoints, including hospital readmissions, morbidity, mortality, and the need for discharge to skilled nursing facility [57–60]. Clinical data also suggest that CPS may indeed be a simplified surrogate of “frailty” [33,

58, 60]. The Beers criteria and STOPP and START criteria are tools to help reduce unnecessary pharmaceutical use in the frail population and may be helpful in preventing adverse medication events [87, 88]. In addition, the creation of geriatric units or treatment teams, with staff specifically trained to treat the frail and elderly, may help ensure that patients are not discharged from hospital on inappropriate medications.

Of importance, frail patients have been found to be more likely to use fall-risk-increasing drugs (FRIDs) as compared to their less frail counterparts, despite the danger of recurrent falls [89]. This further highlights the need to limit the use of unnecessary medications in the frail patient population. Although the responsibility for this rests primarily on the prescribing physician, visiting nurses and pharmacists could play an important role in monitoring for drug-drug interactions or inappropriate medication use. Given that there is a growing body of evidence to suggest that patients are more likely to be frail and suffer adverse outcomes if they have diseases such as cancer [90], renal failure [91], human immunodeficiency virus (HIV) [92], heart failure [93], or diabetes [94], it seems reasonable that the screening for, and identification of, frailty in these patient populations may lead to improved outcomes, more appropriate interventions, and better prevention.

In the emergency department (ED) setting, the challenge of screening for frailty is particularly difficult, given the time and resource constraints placed on emergency physicians and staff. One solution is the introduction of specialty teams of practitioners dedicated to assessing elderly patients arriving to the ED, resulting in the reduction of admissions from nursing homes [95]. Furthermore, if an elderly patient is evaluated by a geriatric team in the ED, they are more likely to be assessed using the CGA (Comprehensive Geriatric Assessment), and thus more readily identified, triaged, and cared for appropriately [96]. Specialty clinics dedicated to comprehensive and multidisciplinary assessment of frail older persons may be useful not only in terms of secondary prevention and management of frailty (and hence prevention of dependency) but also provide an opportunity for more aggressive monitoring and follow-up of this particular patient population as well as further research [97]. In summary, it is generally accepted that the identification and management of the frail patient should be overseen by dedicated specialty teams. Such teams should ideally consist of appropriately trained physicians, advanced practitioners, geriatric nurse specialists, physical therapists, pharmacists, and nutrition experts, and other health professionals.

6. Frailty: interventions and pitfalls

As we age, our bodies exhibit changes at both molecular and cellular levels. Some molecular changes are shared between tissue types and organ systems, whereas others are unique and specific. With advancing age, body composition changes, as evidenced by loss of muscle mass and increased percentage of body fat [98]. There is also a loss of bone mass, narrowing of joint spaces, and a decrease in total body water [98, 99]. Muscle mass may decrease by as much as 50% and body fat may increase to comprise up to 30% of body weight [99]. Once a “frail or pre-frail” individual is identified, it is critical to promptly begin interventions to slow down

the progression of frailty. As outlined previously, these interventions should involve a well-coordinated, multidisciplinary approach. Key components of such a coordinated approach—physical activity, nutritional support, psycho-social support, and pharmaceutical management—are discussed.

Encouraging patients to remain active is among the most successful interventions to address frailty, both from the physical and cognitive perspective [100–102]. In a randomized study, 6 months of physical therapy reduced the functional decline of elderly patients living at home [74]. A meta-analysis investigating the impact of exercise on the quality of life in frail patients showed that exercise improves gait, balance, and performance of activities of daily living (ADLs) [103]. Of note, the majority of available research in this area involves supervised, short-term exercise regimens, making it difficult to generalize results to other settings. Furthermore, not all interventions were equally effective, with only three out of eight specific interventions reporting positive results in one analysis [104]. Finally, it is important for clinicians to determine if the patient is physically ready to begin exercise routines before proceeding, with emphasis being placed on ensuring safe environment for physical activity [105].

The importance of key factors behind nutritional supplementation (e.g., caloric, protein, and essential nutrient intake) has been studied extensively in relation to frailty. One study found that decreased caloric intake (e.g., <21 kcal/kg), low protein, and vitamin D and vitamin E intake were all associated with frailty [106]. While research on nutritional supplementation is still limited in the frail population, it is known that protein supplementation in elderly can be beneficial [107]. At the same time, a multicenter trial found that vitamin D supplementation did not improve rehabilitation outcome in frail individuals following injury [108]. There is some evidence that regular consumption of polyunsaturated fatty acids (PUFA) may be of benefit in modifying cognitive decline associated with aging [109]. The clinician should remember that isolated dietary interventions are not sufficient to combat frailty. With much more research needed in this area, there is thus far no definitive demonstration of benefit of nutritional interventions on measures of disability [104].

Pharmaceutical interventions in the frail population have revolved around the use of targeted therapies, coupled with polypharmacy reduction [107, 110, 111]. Of note, targeted programs to reduce polypharmacy result in fewer adverse events and better clinical outcomes [112–114]. In terms of specific interventions, anabolic agents have been shown to increase muscle mass but failed to improve strength or function in elderly patients [107]. Important research in the area of frailty involves erythropoietin and its potential neuroprotective and regenerative properties [100], angiotensin-converting enzyme (ACE) inhibitors [115], hormone therapies [116], and other pharmaceutical interventions to reverse sarcopenia [117] and cognitive decline [118, 119].

Given the above information in aggregate, it is reasonable to state that multi-pronged, coordinated programs encompassing physical activity, social support, nutritional supplementation, and pharmacologic interventions will be more effective than isolated efforts in each of the above areas [100–102, 107, 110, 111, 120].

7. Frailty: focus on prevention and care optimization

In the context of prevention and care optimization, it is critical to define and quantify the types of adverse events that are more prevalent within the “frail” and “pre-frail” populations. For example, frailty is associated with various adverse occurrences such as falls, disability, and death [121, 122]. Frail patients are more susceptible to skeletal fractures, healthcare associated infections, delirium, incontinence, malnutrition, dehydration, and skin breakdown [121, 123]. These factors all directly and indirectly contribute to morbidity, disability, and mortality. Injury and acute illness have a disproportionate impact on frail patients because of the impaired healing process, slower physical recovery, and longer hospital and intensive care stays when compared to non-frail patients [124, 125]. Frail patients also have higher rates of functional dependence, hospital readmission, and are less likely to go back to independent living after discharge [57, 126]. Because this negative feedback cycle is often difficult to halt once it has begun, it is critical that early prevention is implemented. Promoting healthy and positive behaviors (e.g., physical activity, reducing tobacco/alcohol use), and ensuring adequate community support helps reduce the risk of adverse events [127, 128]. Because acute exacerbations of chronic illness such as diabetes, heart failure, and pulmonary disease can quickly trigger complications in frail patients, regular provision of preventive care and structured medical follow-up are vitally important [129].

As outlined in previous sections of this chapter, adequate nutrition is important to both prevention and recovery from various health crises. Physiological changes due to aging and comorbid illness predispose the older population to malnutrition [130, 131]. With this in mind, both identification and prevention of nutritional deficiencies become critical in the multi-pronged approach to the frail patient [132, 133]. Finally, whereas in the past there existed a clear separation between acute care (i.e., inpatient hospitals, outpatient clinics) and long-term care (i.e., retirement homes, assisted living, home health), skilled nursing facilities have gradually begun to provide subacute care and rehabilitation services [134, 135]. Assisted living has played a major role in caring for frail patients, with many assisted living facilities offering services such as medication management, skilled nursing care, and extensive functional support [136]. Also important is the rapidly evolving concept of “chronic critical illness” associated with prolonged recovery from serious illness in the setting of pre-existing or newly acquired frailty [137]. A new “level of care” in the health care continuum arose as a response to “chronic critical illness” in the form of Long-Term Acute Care units [137].

The Older Americans Act (OAA) defines a multipurpose senior center as “...a community facility for the organization and provision of a broad spectrum of services, which shall include provision of health (including mental health), social, nutritional, and educational services and the provision of facilities for recreational activities for older individuals” [138]. In 2011, the National Council on Aging (NCoA) issued a reauthorization of the Older Americans Act which focused on multipurpose senior centers for positive aging, proposing that existing senior centers modernize to foster innovation, leadership, and capacity-building [139]. Many facilities were recognized as centers for positive aging even before the reauthorization. These centers feature specialty teams consisting of geriatricians, nurse practitioners, and social workers who provide consultations, comprehensive evaluations, and recommendations for senior care.

These teams work with patients, family members, and primary care providers to evaluate the patient's physical, emotional, social, and functional needs and assist in planning for the future [140].

Aging is associated with physical, psychological, and social factors that collectively contribute to the development of dependence. Consequently, frail patients should be encouraged to take active part in their own medical care. Active patient participation allows medical staff, caretakers, and family members to better understand expectations, goals of care, and treatment outcomes. The introduction of electronic health records allows patients to become engaged in their own care [141]. It is hoped that patient participation in self-management programs can translate into better outcomes, especially for the frail and elderly patients [142].

8. Rehabilitation: managing the frail patient

Injury and acute illness among older adults, frail or not, is always a significant event. Because functional capacity is likely to further decline following injury or acute illness, rehabilitation is of utmost importance in this setting, especially for older, frail patients [143]. To maximize rehabilitation potential, a multidisciplinary approach involving coordinated medical and nursing care appears to be the most effective way of optimizing the patient's functional status [144].

Because severe cognitive impairment is associated with poor functional recovery, individuals who fall into this category require special attention [145, 146]. Cognitive tests to determine baseline status and to predict potential for improvement may be helpful [147]. Of note, individuals with below average functional status at baseline have the most to gain from rehabilitation. In a society in which length and type of medical care are determined with cost in mind, caution must be taken to prevent short-term cost-saving measures from compromising long-term outcomes in frail patients undergoing rehabilitation [144, 148].

In order to create an environment where frail patients can thrive, it is important to focus on preventing adverse events (and other factors) that may negatively affect the recovery and rehabilitation process. Depression and cognitive impairment correlate with negative outcomes in elderly patients undergoing rehabilitation [149, 150]. In addition, pressure ulcers, urinary incontinence, and hearing impairment, when present, may further worsen the overall functional decline [151]. Many of these factors can be prevented, treated, or otherwise modified by leveraging various ancillary services to improve outcomes [152]. Patients who are unable to control their bowel and bladder function greatly benefit from interventions (i.e., rotation, pressure pads, etc.) that prevent pressure ulcers [153].

9. Miscellaneous topics: futility, delirium, and cognitive decline

The challenges with futility often have as much to do with the care provider as with the patient [154]. It is generally difficult to achieve agreement among providers caring for an individual

and between different specialties consulting on the same patient. Further complicating these situations is the transition from “generally well” to “functional ill” to “not well/frail” to “acutely sick/dying” [155]. As physicians, we may be able to “see” the differences, but the family may simply see their very sick loved one still connected to “all of those machines/drips/monitors”, yet not necessarily grasping the true severity of illness [156]. It is often difficult to achieve adequate understanding of futility after the intensive care team has been employing aggressive management approaches for days, weeks, or even months [157, 158].

Additional level of complexity emerges due to the lack of universal, legal definition of futility and state-to-state variations regarding existing options and responsibilities [159]. For example, Texas has a well-defined (but still controversial) futility statute [160, 161], while other localities have no formal statutes recognizing (or defining) futility [162]. Most biomedical ethicists support the autonomy of an individual physician to refuse a treatment or procedure that he or she is morally, ethically, or religiously opposed to (or feels that it would cause undue harm to the patient). In exchange, that physician has an obligation to refer the patient to another provider [163]. Abandonment, without transferring care to another competent individual, is never an option [164]. When approaching a futile situation, key questions need to be answered in order to better guide the course of goals-of-care discussions and subsequent magnitude of therapeutic interventions: (a) What are the values of the patient/family? (b) What gives meaning to a life of the patient and his/her family? (c) What qualities/aspects of care would represent unacceptable burdens? (d) What are the patient’s hopes and fears?

Important considerations for individual providers include (a) clarity over what is determined to be futile; (b) the ability to recognize own biases, especially in the context of a futile situation; (c) maintenance of consistent communication within the team and with the patient/family; (d) having an accurate assessment of patient understanding and competence/capacity; (e) providing consistent palliation/palliative care (understanding physical, emotional, social, and spiritual aspects); and (f) consideration of all available options including hospice care when meeting with the patient and his/her family. A summary of the above considerations is provided in **Table 2**.

One should initiate the discussion about futility by providing an honest and realistic assessment of the medical situation [165]. A parallel assessment of the patient/family’s values and goals of care is also made during the process. The ability to establish a collaborative working relationship between the health care team and the patient/family will help facilitate subsequent understanding in case that any future aggressive care becomes futile, and a strictly palliative approach (e.g., hospice) is more in keeping with patient/family goals [166, 167]. Of importance, key ethical principles of autonomy, beneficence, non-maleficence, and justice must be embedded throughout the entire process [168–170]. Together, these principles can help guide the creation of a rational plan of care [168–170]. Considering the unit of care as the “patient-family” as opposed to just the patient may also broaden our understanding of unique dynamics that may influence the decision-making process. Defining futility, especially in the geriatric population, must include a broad-based assessment consisting of the following key elements [154, 171–173]:

Communication considerations

Ask-Tell-Ask: Do not make any assumptions. Answer honestly and directly.

Sit-Listen-Make eye contact: Make sure that everyone is there who needs to be there.

SPIKES: Set up, Perception, Invitation, Knowledge, Emotions, Strategy/Summary.

Address emotion: Name; Understand; Respect; Support; Explore

Advance care planning: Start early; Review with any change in status/level of care; Know applicable status levels; Conversations now a billable visit under Medicare regulations.

Living will versus advance directive

Durable power of attorney for health

Guardianship—If no other acceptable options exist, consider sooner than later if patient lacks capacity or competence and no other documents have been completed.

POLST—Physician Orders for Life-Sustaining Treatment should be completed for anyone with frailty or anyone in whom you would not be surprised if they were to die within the next year.

Risk of abuse and social vulnerability

Frailty increases the risk of abuse

Prevention and education

Working closely with patients and families

Available programs and organizations

Compiled from Eng et al. (1997) *J Am Geriatr Soc* 45(2):223–232 ; Evans et al. (2006) *The Cancer Journal* 12(5): 417–424; Harris (2007) *Postgraduate Obstetrics & Gynecology* 27(4): 1–4; Wittenberg-Lyles et al. (2008) *Social Science & Medicine* 66(11): 2356–2365.

Table 2. Important considerations and concepts when communicating about frailty and related issues, including end-of-life issues.

- *Patient factors:* (a) comorbid medical conditions; (b) functional capacity (e.g., Karnofsky/Palliative Performance Scale or PPS [174]); (c) medication profile; (d) competence/mental capacity [175]; (d) quality of life; (e) overall goals and values; (f) documented wishes (advance directive/living will/Physician Orders for Life-Sustaining Treatment (POLST) [176])
- *Social and cultural factors:* (a) Where does the patient live? (b) Who does the patient live with? (c) Who helps them, including decisional support? (d) What are their financial resources or limitations? (e) What is the patient's access to care? Available transportation? (f) What is the patient's cultural/ethnic background? (g) Regarding community resources, who is in the "extended family"? (h) Is the patient safe? Is there any potential for abuse?
- *Emotional factors:* (a) Is there an underlying mental illness? (b) Is there an underlying substance abuse/addiction? (c) Is there a suspicion of elder abuse or neglect? (d) Is loneliness/isolation an issue?

- *Spiritual/religious factors* [177]: (a) Is faith important to the patient/family? (b) How does faith or belief impact decision-making? (c) Does the patient have a faith community?

Communication about futility should begin well before the “futility line” is crossed. It is important to consider the whole person when discussing subjects such as living wills and advance directives, and the conversation should be as much about the value, meaning, and quality of life as it is about whether to resuscitate someone [178]. Framing a conversation around realistic hopes and goals enables the patient and his/her family to clearly identify appropriate goals of care and, when appropriate, initiate discussions about palliative care, hospice, and Physician Orders for Life-Sustaining Treatment (POLST [179]) with a goal of avoiding unwanted medical situations (e.g., hospitalization, intensive care stays, long-term dependence on nursing care, etc.) [180, 181]. Discussing how to live, for a frail elderly individual with multiple medical conditions, should also include conversations about how to die [182]. Asking people who they are and what is most important to them allows the practitioner to frame recommendations for care in terms of the patient’s goals, and not in terms of aggressive treatments that may be more burdensome than beneficial. Also, framing the conversation around positives helps preserve dignity in end-of-life care (e.g., “hospice care can allow you to be at home with your family and be comfortable” versus “there is nothing more we can do for you so we are calling hospice”) [183].

Aging is a loss of homeostasis, or a breakdown in maintenance of specific molecular structures and pathways. It is the inevitable consequence of evolved anatomy and physiology of an organism [184]. Determining what constitutes normal aging and whether a decline in functional ability is attributable to disease or pathology can be challenging. While a series of changes occur with “normal” aging, a major characteristic of aging is the heterogeneity among the rates of functional decline [99]. Time, genetics, disease, environmental, and behavioral factors all contribute to aging and frailty [185–188]. The human body maintains significant reserve capacity, allowing individuals to endure and overcome a great deal of stress. Aging lowers the ceiling for an organ’s or individual’s reserve, and older adults have a lowered maximal capability when compared to younger individuals [99]. Thus, biologic age (represented by frailty), based on an individual’s functional capacity, and not chronologic age, is the more optimal metric for studying the phenomenon of aging. Functional capacity is a direct measure of the ability of cells, tissues, and organ systems to function properly and optimally, and is influenced by both genes and environment [185–188]. Gradual changes in cells, tissues, and organs of the body lead to the eventual breakdown of maintenance processes—an inevitable consequence of the evolved anatomy and physiology of the organism [184].

10. Conclusions

As the geriatric segment of the world population continues to grow, the topic of frailty is bound to gain prominence around the globe. Despite significant amount of research available in this area, better understanding of frailty and its underlying mechanisms is required. The concept of frailty has evolved significantly since the mid-twentieth century, from the stereotypical

description of a “thin, stooped, slow octogenarian” [7] to more contemporary definitions grounded in scientific evidence and practice. In this chapter, we reviewed some of the key issues that practitioners may encounter when treating frail patients, including identification of frailty, preventive and therapeutic options, common pitfalls, and related topics, including an overview of “goals of care”/end-of-life considerations.

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