Frailty : Update on Diagnosis Evaluation and Management Part 1

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ABSTRACT

Life expectancy continues to rise globally. However, the additional years of life do not always correspond to years of healthy life, which may result in an increase in frailty. Given the rapid aging of the population, the association between frailty and age, and the impact of frailty on adverse outcomes for older adults, frailty is increasingly recognized as a significant public health concern. Early detection of the condition is critical for assisting older adults in regaining function and avoiding the negative consequences associated with the syndrome. Despite the critical nature of frailty diagnosis, there is no conclusive evidence or consensus regarding whether routine screening should be implemented. A variety of screening and assessment instruments have been developed from a biopsychosocial perspective, with frailty defined as a dynamic state caused by deficits in any of the physical, psychological, or social domains associated with health. All of these aspects of frailty should be identified and addressed through the use of a comprehensive and integrated approach to care. To accomplish this goal, public health and primary health care (PHC) must serve as the fulcrum around which care is delivered, not just to the elderly and frail, but to all individuals, by emphasizing a life-course and patient-centered approach centered on integrated, community-based care. Personnel in public health should be trained to address frailty not just clinically, but also in a societal context. Interventions should take place in the context of the individuals' environment and social networks. Additionally, public health professionals should contribute to community-based frailty education and training, promoting community-based interventions that assist older adults and their caregivers in preventing and managing frailty. The purpose of this paper is to provide an overview of frailty for a public health audience in order to increase awareness of the multidimensional nature of frailty and how it should be addressed through an integrated and holistic approach to care.

Key words: **Frailty, diagnosis, evaluation, management**

Introduction

- There is currently no consensus on a definition or clinical tool for frailty, and there is insufficient evidence to guide primary care frailty case finding and management.
- While studies have demonstrated that frailty increases the likelihood of medical complications, disability, institutionalization, or even death, evidence regarding how well frailty predicts adverse outcomes at the individual patient level is lacking.
- Screening for frailty in primary care will be justified only after sufficient evidence of interventions that improve clinical and patient-centered outcomes becomes available.

One of the century's major achievements is the continued increase in life expectancy.

The world is aging at a breakneck pace. There are currently 703 million people aged 65, according to the United Nations Department of Economic and Social Affairs' "World Population Aging 2019" report. By 2050, this figure is expected to reach 1.5 billion, or one in every six people, up from one in every 11 in 2019 (1). Similarly, the number of people over the age of 80 is expected to triple in the next 30 years, while life expectancy after 65 is expected to increase by 19 years (1). However, the additional years of life do not always correspond to years of healthy life. According to Eurostat's most recent figures for 2020, the proportion of healthy life years in the European Union (EU) accounts for approximately 76.7 and 81.4 percent of total life expectancy for women and men, respectively (2). The decline in healthy life years is accompanied by an increase in frailty, multimorbidity, and disability (3), all of which contribute to older adults' frequent use of healthcare services (4). All of the conditions listed above have the potential to impair multiple domains of health (physical, psychological, cognitive, and social), necessitating holistic care for complex needs resulting from multiple determinants of health.

The aging of the population is bringing about changes and challenges that necessitate a comprehensive public health response. The challenge is to ensure that people can live longer while also remaining healthy, active, and self-sufficient. The challenge is to establish sustainable and efficient health and care systems capable of dealing with the prospect of an increase in chronic diseases, cognitive decline, or dependency, as well as the associated consequences.

The frailty of the elderly is a distinguishing feature (5). Frailty has long been a part of the everyday lexicon. 'How easily a frail tree is overturned by the wind,' Buddha reflected some 2500 years ago (6). This historical ubiquity has resulted in an inherited proclivity for recognizing frailty. Frailty, on the other hand, has only recently been brought into focus for more rigorous medical definition as a result of a shift in emphasis away from single-system conditions and toward unifying constructs for holistic patient care.

Frailty is a physiological state of vulnerability caused by dysregulation in multiple physiological systems. It results in a decrease in an individual's functional capacity and resilience to external stressors, resulting in increased rates of illness, disability, and death (3), (7), (8).

Frailty can occur at any age and is frequently triggered by specific circumstances such as malnutrition or chronic disease states such as diabetes, chronic obstructive pulmonary disease,[9] chronic heart failure,[10], or HIV infection (11–13). While it is tempting to view frailty as an inevitable consequence of aging, associated with an increased risk of poor health outcomes,[14] a distinction must be made between an individual's chronological and biological ages, as some individuals may remain robust and disability-free well into their advanced years. Individual-level factors such as resilience (physical and mental), external supports, and other forms of intrinsic capacity[18] can help moderate frailty, and these must also be considered when examining clinical practice-based pathways to alleviate frailty [20].

Frailty is increasing in prevalence. Around 10% of people over the age of 65 and 25%–50% of those over the age of 85 are frail (20). Age-related frailty, disability, and suffering are major priorities for our society and health and care systems. Care delivery in an efficient manner that is tailored to individual needs and social circumstances is an unavoidable responsibility for policymakers and management teams. The critical mass of experiences and knowledge generated by already-implemented interventions, contributes to paving the way toward that goal.

Frailty has compelled a number of countries to make fundamental changes to their national health policies. For example, since 2017, England's new General Medical Services (GMS) contract requires all primary care practices to use an appropriate tool to identify patients aged 65 with moderate or severe frailty. Due to the complexity of frailty, healthcare professionals face difficulties in identifying and managing this condition (HCPs). To meet these challenges, countries must develop a health workforce equipped with the appropriate skill mix. A goal-oriented education and training of health care professionals is critical for the effective and efficient delivery of health care to the world's aging population (21).

Thus, screening and monitoring for changes in older people's individual resilience is critical for early intervention in order to avoid a loss of functional and cognitive reserve and to maintain self-capacity for this growing population of older citizens (22).

Frailty - What is it?

Frailty is a multifaceted age-related syndrome that lacks a widely accepted definition (23,24). It is caused by a decline in multiple physiological systems, resulting in an increased susceptibility to stressor events and an impaired ability to maintain homeostasis (25). These triggers can include a chronic condition deteriorating (26), environmental factors (27), a change in therapy (3), or adverse life events (28). Frailty is characterized by a progressive decline in physiological reserve in older adults (29). Frailty is also associated with an increased risk of adverse outcomes (30), including falls (31), fractures (32), disability (31), delirium (33), depression (34), cognitive impairment (35), hospitalizations (36, 37), need for long-term care (31), poor

quality of life (38), shortened life expectancy, and premature death (39). While research into frailty is ongoing, certain tenets of the condition have been established: it is an age-related condition (40), though it is not a necessary consequence of the aging process (41). It is multidimensional, affecting multiple domains of health, including the physical, psychological, cognitive, social, emotional, spiritual, economic, and nutritional domains (41, 42, 43). It is a dynamic and reversible state, at least in its early stages (44), in which individuals can fluctuate between states of robustness and frailty until their physiological reserve is depleted and recovery to their baseline status is impossible (45). Additionally, reversing frailty is more common than transitioning to more severe levels of frailty. Given that frailty reflects biological rather than chronological age (46, 47), it is critical to identify biomarkers for this condition. However, biomarkers that more accurately reflect biological age than chronological age are currently unavailable (48). These may also aid in objectively identifying frailty and contributing to a better understanding of its pathophysiology.

Transition to Frailty

Because frailty transitions should ideally indicate changes in physiological reserve and function, accurately characterizing them may eventually provide a means of detecting and delineating these underlying changes. Although various transitions between frailty states were observed, the most frequently observed transition was a worsening of frailty, as previously discovered (49). Pre-frailty was found to be extremely prevalent (46%) and was associated with a higher risk of adverse outcomes than being non-frail (0.12 odds of death vs 0.05 in non-frail), as well as an increased risk of becoming frail (0.17 odds of frailty vs 0.03 in non-frail). This information, combined with the finding that frail individuals are more likely to die (0.28 vs. 0.16), suggests that pre-frail individuals are the optimal target for frailty intervention and prevention, but pre-frail individuals are not always easily identifiable in the clinical setting. As a result, although screening for frailty in the clinical setting is not routine clinical practice, it is becoming increasingly recognized as critical for identifying vulnerable older adults (50).

While the association between COPD and frailty may seem intuitive given the well-characterized clinical manifestations of pulmonary cachexia syndrome, obesity, insulin resistance, and diabetes mellitus are emerging risk factors for sarcopenia and frailty (51). Given the high prevalence of diabetes mellitus and prediabetes among older adults, frailty screening may be especially beneficial in identifying those at greatest risk of decline. Additionally, the study's finding that increased leg power was associated with improved frailty suggests that exercise, a critical component of lifestyle modification in individuals with prediabetes or diabetes mellitus, may help prevent frailty in older adults (52).

As noted in a recent review(53), measurement precision for phenotypic frailty measures such as those used by Pollack and colleagues has received scant attention (54). Gill and colleagues evaluated interrater test–retest agreement in a study of frailty transitions and hospitalization; they reported a kappa statistic of 0.78 for frailty measurements taken three days apart—an impressive overall agreement of roughly 90% at the study's observed 26% frailty prevalence. Apart from agreement, the accuracy with which observed criteria measure an underlying trait or state of frailty is also critical. In the Study of Health, Ageing, and Retirement in Europe, Theou and colleagues reported a Cronbach alpha of 0.47 for frailty phenotype measurements, indicating only moderate trait measurement reliability. Using latent class analyses (LCAs) of data from the Women's Health and Aging Study, Xue and colleagues (55) estimated the positive predictive value of a phenotype measurement for detecting frailty to be 53%. (56). These LCAs indicated a significant over-representation of prefrail assessment in frail and robust states. As such, we found it intriguing that Pollack and colleagues discovered near equality in the rates of improvement from frail to prefrail status, prefrail to robust status, and progression from prefrailty to frailty between Visits 1 and 2 (range 15.0–17.4 percent). We believe that additional research is necessary to distinguish between phenotypic transitions that represent meaningful frailty change and those that are spurious or indicative of non-frailty related change. Additionally, we acknowledge that, in addition to the phenotypic method, there are a variety of other approaches to frailty assessment (57) that complicate measurement.

Models of Frailty

The physical frailty and deficit accumulation models of frailty are the two most frequently used approaches for classifying frailty. The Frailty Physical Phenotype was first proposed by Fried et al. (58), who used the Cardiovascular Health Study to define the "frailty phenotype" by identifying five physical components: exhaustion (self-reported), low physical activity, weakness (low grip strength), slow gait speed, and shrinking (unintentional weight loss of 5% in the preceding year), the presence of which in number 3 indicates frailty. When only one or two criteria are met, individuals are classified as pre-frail, whereas when no components are present, individuals are classified as robust. Rockwood and Mitnitski (59) and Mitnitski et al. (60) validated the cumulative deficit model using data from the Canadian Study of Health and Aging to develop a Frailty Index, which initially included a total of 70 deficits, including signs, symptoms, disabilities, diseases, and laboratory investigations (61). The total number of disorders present in an individual is divided by the total number of items examined: the more deficits present, the greater the likelihood that the individual is frail (62). The frailty index may contain a variety of items, including activities of daily living, diseases, and impairments, because not all deficits must be considered, and a subset may be used (63). While these two operational models are the most frequently used frailty constructs, they are distinct and should be viewed as complements rather than substitutes (63). It is worth noting that neither measure encompasses all facets of frailty; the frailty phenotype almost exclusively measures physical frailty, whereas the frailty index measures multimorbidity but does not clearly distinguish frailty from disability (63). Frailty is more than the presence of multiple deficits, limitations in daily living activities, or physical deficits on their own. Additionally, it incorporates elements pertaining to the individual's functional reserve, psychology, and social environment. Recently, a variety of screening and assessment instruments, such as the Comprehensive Frailty

Assessment Instrument (64) and the Tilburg Frailty Index (65) with a more biopsychosocial orientation have been developed (66). This definition defines frailty as a dynamic state caused by deficiencies in any of the physical, psychological, or social domains associated with health. Along with the physical and deficit accumulation models of frailty, this conceptual model lacks a specific operational definition.

Frailty and Sarcopenia

Numerous pathophysiological changes associated with frailty remain unknown (32). Rosenberg coined the term sarcopenia in the late 1980s to refer to the progressive loss of lean body mass associated with aging (67). One of the earliest theories linking frailty and sarcopenia dates all the way back to 1994, when Fiatarone et al. hypothesized a link between frailty and muscle mass decline, implying that increasing muscle mass may be beneficial for frailty sufferers (68). While a link has been established between sarcopenia and frailty, the pathophysiology of frailty appears to be more complicated than the effect of sarcopenia alone (69–71). For instance, it is still unclear whether sarcopenia causes frailty or is a symptom of it. Sarcopenia, like frailty, is more prevalent in older adults, is associated with adverse outcomes, and may be reversible (72). Both conditions have the potential to result in functional decline and disability; thus, early detection is recommended for both (72). To further investigate this connection, Calvani et al's ongoing study "BIOmarkers associated with Sarcopenia and PHysical frailty in Elderly People" (BIOSPHERE) proposes to identify biological markers for sarcopenia and physical frailty through blood sample analysis, which may shed some light on the relationship between frailty and sarcopenia (72). A better understanding of the two disorders and their relationship may aid in their prevention and management.

Multimorbidity and Frailty

The epidemiological shift has resulted in an increase in life expectancy. As a result, chronic rather than acute conditions have surpassed acute conditions as the leading cause of morbidity and mortality (73). As a result, as they age, older adults are increasingly confronted with multimorbidity and chronic diseases such as diabetes, hypertension, and dementia (74). The presence of two or more chronic diseases is referred to as multimorbidity (75, 76). Its effect on health status is contingent upon the interaction of the specific illnesses that affect the individual concurrently (77), which is greater than the sum of the effects expected from each disease individually (78). Frailty and multimorbidity are two distinct but overlapping conditions (19, 58, 69) that require distinct management and prevention strategies (79, 80). While having multiple chronic conditions is associated with the development of frailty, frailty is not always a result of chronic disease. Frailty can exist in the absence of chronic conditions, implying that it develops via a variety of different pathways (81). The evidence demonstrating how multimorbidity can result in frailty is still lacking (82, 83), and additional research is required. Both conditions become more prevalent as people age, even if they do not affect only the elderly (84). Multimorbidity, on the other hand, is more prevalent than frailty, with up to three out of four people aged 75 years meeting the criteria for multimorbidity (85–87). Additionally, chronic diseases and frailty are associated with adverse outcomes and a poor prognosis when both are present (88).

Due to the fact that frailty is a more reliable predictor of adverse outcomes than multimorbidity (89), the National Institute for Health and Care Excellence and the British Geriatric Society emphasize the critical nature of recognizing frailty in older adults with multimorbidity, as these individuals are at a higher risk of adverse outcomes (90, 91). This could aid in the targeting and rationalization of appropriate multimorbidity treatment, given that evidence suggests that intensive or excessive treatment of chronic diseases may worsen health outcomes in frail people (92). Additionally, when caring for individuals who are frail and have multiple diagnoses, it is critical to keep in mind that frailty may impair adherence to both pharmacological and physical therapies (93).

Frailty and cognition

Within the biopsychosocial model of frailty, research into the cognitive and psychological aspects of the syndrome has revealed a link between physical frailty and cognitive impairment, resulting in the conceptualization and operationalization of cognitive frailty (94). The International Academy of Nutrition and Aging reached consensus on a definition of cognitive frailty, defining it as a state that requires the presence of physical pre-frailty or frailty [according to the Frailty Phenotype], as well as mild cognitive impairment (MCI), defined as questionable dementia on the Clinical Dementia Rating (CDR) (score 0.5), a state similar to MCI (95). Recently, two distinct subtypes of cognitive frailty have been proposed based on these criteria: reversible cognitive frailty (i.e., pre-MCI, CDR score = 0) and potentially reversible cognitive frailty (i.e., MCI, CDR score = 0.5) (96–98). Both subtypes require the coexistence of physical pre/frailty, and studies have revealed that gait speed or grip strength is the most frequently associated physical characteristic with cognitive frailty (99). Other than the CDR, a variety of instruments have been used to detect cognitive impairment (100), resulting in a variety of operational definitions of cognitive frailty (98). As with general frailty, additional research is required to develop a commonly accepted operational definition. In comparison to physical frailty, cognitive frailty can be delayed and reversed, at least in its early stages, and the condition can result in an increased risk of adverse health outcomes , including disability (101), decreased quality of life (102), hospitalization, and mortality (103). Thus, public health professionals advocate for a life-course approach that includes early intervention with preventative strategies such as physical activity and dietary modification, such as the Mediterranean diet (98). These interventions may help prevent or delay the onset of cognitive frailty, as well as sarcopenia and physical frailty (104), though additional research is necessary to confirm these findings.

Frailty and health-related social determinants

In a broader sense, health is influenced by a variety of factors other than medical ones, including social, economic, political, and environmental factors; individuals are impacted by a variety of environmental and social factors that have an effect on their health (105), and contribute to social vulnerability (106). Additionally, social determinants of health, such as education,

housing, employment, nutrition, and environmental protection (107), can impair an individual's intrinsic and extrinsic capacity, resulting in frailty. The capacity of the individual and their social and caregiver network to manage frailty has a greater impact on the risk of a wide variety of adverse outcomes, including institutionalization and death, than their medical conditions or ability to perform daily activities do (108). Thus, because frailty manifests itself not only in the physical and psychological realms, but also in the social realm, it is critical to investigate the social consequences of frailty. While patient-centered care is becoming more prevalent in health management, additional research into the relationship between frailty and social vulnerability is necessary to ensure that an individual's social environment, perspective, and desires are not overlooked. The work of Azzopardi et al. demonstrates how, even within the biopsychosocial model of frailty, health and social care professionals fail to adequately consider the social aspects of the individual, particularly the environmental and personal factors (e.g., relationships) (106). A recent scoping review determined that the loss of social activities and self-management abilities are critical components of social frailty (i.e., insufficient social resources to meet an individual's social needs) and must be supported to minimize adverse outcomes (109). Because public health professionals have a broader perspective on health determinants than clinicians do, they are uniquely positioned to address people's social needs and intervene in their home environment.

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