

Frailty syndrome: implications and challenges for health care policy

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Abstract: Older adults are a highly heterogeneous group with variable health and functional life courses. Frailty has received increasing scientific attention as a potential explanation of the health diversity of older adults. The frailty phenotype and the Frailty Index are the most frequently used frailty definitions, but recently new frailty definitions that are more practical have been advocated. Prevalence of frailty among the community-dwelling population aged 65 years and older is ~10% but varies depending on which frailty definitions are used. The mean prevalence of frailty gradually increases with age, but the individual's frailty level can be improved. Older adults, especially frail older adults, form the main users of medical and social care services. However, current health care systems are not well prepared to deal with the chronic and complex medical needs of frail older patients. In this context, frailty is potentially a perfect fit as a risk stratification paradigm. The evidence from frailty studies has not yet been fully translated into clinical practice and health care policy making. Successful implementation would improve quality of care and promote healthy aging as well as diminish the impact of aging on health care systems and strengthen their sustainability. At present, however, there is no effective treatment for frailty and the most effective intervention is not yet known. Based on currently available evidence, multi-domain intervention trials, including exercise component, especially multicomponent exercise, which includes resistance training, seem to be promising. The current challenges in frailty research include the lack of an international standard definition of frailty, further understanding of interventions to reverse frailty, the best timing for intervention, and education/training of health care professionals. The hazards of stigmatization should also be considered. If these concerns are properly addressed, widespread application of public health approaches will be possible, including screening, identification, and treatment of frailty, resulting in better care and healthier aging for older people.

Keywords: frailty, health care policy, geriatrics

Introduction

Life expectancy has markedly increased worldwide during the past 100 years, mainly due to public health improvements.¹ This demographic transformation of the population has resulted in growing numbers of older adults in both developing and developed countries.² Between 2000 and 2050, the proportion of people aged 60 years or older in the world is projected to double from about 11% to 22%, an increase from 605 million to 2 billion adults aged ≥60 years.¹ The number of older adults aged over 80 years is expected to quadruple to 395 million during the same period.¹ In general, we tend to develop more health problems and become frailer as we age. The increase in

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life expectancy allows chronic diseases to develop while physical and cognitive functions decline, which predisposes older people to disability or dependency.

Older adults are a highly heterogeneous group. Their life courses of health and functional status vary substantially, depending on their genetic, biological, and environmental backgrounds as well as other physical, psychological, and social factors. Therefore, individuals with the same chronological age can have different biological ages.³ Frailty has received increasing scientific attention as a way of understanding health diversity among older adults.⁴ In the past, the term frailty was used almost interchangeably with aging, disability, or comorbidity, partly because of the similarity and high coexistence rate of these descriptive states.⁵ However, there are clear differences between frailty, aging, disability, and comorbidity. First, advanced age on its own does not necessarily mean vulnerability to negative health outcomes so typical of frailty.⁶ Frailty is at least partly programmed in early life and is also associated with lower socio-economic status in adulthood.⁷ Second, frailty is conceptualized as a state of decreased physiological reserve and compromised capacity to maintain homeostasis as a consequence of age-related, multiple, accumulated deficits.⁴ Frail older people are highly vulnerable to adverse health outcomes when exposed to an internal or external stressor.⁴ Third, whereas frailty refers to instability and risk of loss of function, disability indicates loss of function and often assessed based on difficulty or dependency in performing activities necessary to live independently, such as activities of daily living (ADL), eg, bathing, dressing, eating, toileting, continence, and transferring⁸ and instrumental activities of daily living (IADL), eg, shopping, telephone use, meal preparation, housekeeping, laundry, transportation, medication, and finances.⁹ Finally, comorbidity is defined as having two or more medically diagnosed diseases.⁵ Thus, frailty is clearly different and distinguishable from advanced age, disability, and comorbidity.

Definition of frailty

A number of definitions have been proposed to conceptualize and operationalize frailty.^{10,11} Despite the long-lasting and extensive debates on how best to define frailty, international consensus has yet to be reached and a gold standard definition of frailty is still lacking.⁴ Nonetheless, most conceptual frailty definitions have some factors in common, such as decreased reserves/capacity to tolerate minor stressors, increased vulnerability to adverse health outcomes, and impairment in multiple physiological systems.¹⁰ After the inclusion of

these factors, frailty is conceptually defined as “a clinically recognizable state in which the ability of older people to cope with everyday or acute stressors is compromised by an increased vulnerability brought by age-associated declines in physiological reserve and function across multiple organ systems”.¹² This definition by the WHO has been widely accepted^{4,13} and adopted in the Joint Action ADVANTAGE, a recently launched European Union (EU) initiative.¹⁴

Among various frailty definitions, the most commonly used is the frailty phenotype,¹⁵ developed by Fried et al using the Cardiovascular Health Study cohort in 2001.¹⁶ The Fried frailty phenotype consists of five physical components to define frailty: unintentional weight loss, self-reported exhaustion, weakness, slow walking speed, and low physical activity.¹⁶ Individuals are considered to be frail when they meet three or more criteria, and they are considered to be robust when they have none.¹⁶ Individuals who have one or two criteria are defined as prefrail, a state between robust and frail.¹⁶

The Frailty Index is another popular approach,¹⁵ based on a cumulative deficit model advocated by Mitnitski et al using the Canadian Study on Health and Aging.¹⁷ In contrast to the frailty phenotype, this cumulative deficit approach describes frailty as a state caused by the accumulation of health deficits during the life course, and the more deficits individuals have, the more likely they are to be frail.¹⁵ The Frailty Index, a continuous score ranging from 0 (no deficit) to 1 (all deficits present), is calculated as the ratio of the number of deficits present in the individual to the number of total deficits considered.¹⁸ For the Frailty Index, at least 30–40 deficits, associated with age and adverse health outcomes that are prevalent in 1% or more of the population, should be considered, with fewer than 5% of missing values, and it can include symptoms, signs, diseases, disabilities, abnormalities of laboratory, radiographic, and electrocardiographic findings, and social characteristics.¹⁸

There has been some debate regarding the practical application of these two most commonly used frailty definitions.¹⁹ The frailty phenotype requires special equipment to measure the handgrip strength and space for measuring gait speed. The population-based lowest 20% of the handgrip strength, gait speed, and physical activity need to be calculated based on the population distributions. Calculation of the Frailty Index requires the recording of various types of deficits (typically more than 30–40) and dividing the number of deficits present by the number of deficits considered, which may take ~20–30 minutes,¹⁹ except when data are extracted and calculated automatically from electronic medical records.²⁰

Feasible frailty instruments in a clinical setting

According to the International Association of Nutrition and Aging (IANA) Task Force, a frailty tool should be quick, inexpensive, reliable, and easy to use in clinical settings because the identification of frail older people at risk is an important initial step potentially leading to appropriate preventive and/or treatment interventions and ultimately to higher quality care for this vulnerable population.²¹ From this perspective, the frailty phenotype and the Frailty Index may be rather impractical and unfeasible especially in a busy clinical setting. Based on a systematic review of the literature as well as input from a panel of geriatric experts, the IANA's working group advocated a new frailty tool.²¹ The FRAIL scale is a simple tool consisting of five yes/no questions: Fatigue, Resistance (inability to climb stairs), Ambulation (inability to walk a certain distance), Illnesses (more than five of comorbidities), and Loss of weight (more than 5%),²¹ and has been shown to be able to predict mortality and incident ADL and IADL disabilities among community-dwelling older people in recent meta-analysis studies.^{22,23} The FRAIL scale is also recommended as one of the tools to detect frailty by the Joint Action ADVANTAGE, a EU co-funded initiative launched in 2017 involving 22 member states and over 40 organizations.¹⁴ The main goal of ADVANTAGE is to establish a common European framework for addressing the problems of frailty, including: 1) improvements in screening, diagnosis, prevention, and treatment for frailty, 2) health care system reforms adapted to population aging, and 3) facilitation of research and education on frailty.¹⁴ ADVANTAGE has proposed that tools used for frailty screening should be quick to administer (no more than 10 minutes to complete); require no special equipment; validated; and be meant for screening. Existing frailty instruments meeting these four criteria are Clinical Frailty Scale, Edmonton Frail Scale, FRAIL scale, INTER-FRAIL, Prisma-7, Sherbrooke Postal Questionnaire, Short Physical Performance Battery, and Study of Osteoporotic Fractures Index.¹⁴ The Kihon Checklist, a self-reported comprehensive questionnaire consisting of 25 simple yes/no questions covering multiple domains, is another relatively new frailty tool.^{24,25} This tool was originally developed by the Japanese Ministry of Health, Labour and Welfare in 2005–2006 as a screening tool to identify vulnerable older adults who are at high risk of dependency and more recently has been recognized as a useful frailty assessment tool.^{26,27} This is another brief, simple, quick, and cost-effective instrument which does not need special equipment and takes <10 minutes to complete,¹⁹ and therefore may be appropriate for

screening. These frailty instruments can easily be incorporated into comprehensive geriatric assessment or primary care in a clinical setting for screening frail older adults. Some of them consist of short lists of simple questions and can be administered by not only physicians or other health care professionals but also care givers and non-professionals, in person as well as by phone, mail, or email.

Prevalence and natural course of frailty

The mean prevalence of frailty among the community-dwelling population aged 65 years and older is ~10% but can range widely from 4.0% to 59.1% depending on the frailty criteria used.²⁸ Advanced age is a significant risk factor for frailty and a quarter of those aged 80 years or older are frail.²⁸ A higher prevalence of frailty is also observed in selected populations with specific diseases or conditions, such as patients with cancer (42%),²⁹ end-stage renal disease (37%),³⁰ heart failure (45%),³¹ Alzheimer disease (32%),³² and nursing home residents (52%).³³

Although the mean prevalence of frailty gradually increases with age,^{28,34–37} the individual course of frailty varies and the level of frailty can be reduced even in old age.^{4,38} Several longitudinal population-based studies have showed that 8.3%–17.9% of older adults actually improved their frailty status^{39–44} and that some of them made frequent and dynamic transitions over time.⁴⁵

Impacts of frailty on health care systems

Frail older adults are at increased risk of premature death^{20,22,27,46} and various negative health outcomes, including falls,⁴⁷ fractures,⁴⁸ disability,^{23,49} and dementia,⁵⁰ all of which could result in poor quality of life⁵¹ and increased cost⁵² and use of health care resources,⁵³ such as emergency department visits,⁵⁴ hospitalization,⁵⁵ and institutionalization.⁵⁶ Multiple studies using cohorts of community-dwelling older adults have showed that the health care costs of frail individuals are sometimes several-fold higher than those of non-frail counterparts.^{57–61}

Older adults form the main users of medical and social care services,⁶² and the majority of health care costs are incurred by them. In the context of ongoing population aging, with an unprecedented growing number and proportion of older adults, this epidemiological and demographic population shift is starting to have a major impact on health care systems. Current health care systems are mostly designed to address organ-specific and disease-specific problems one at

a time and are not well prepared to deal with the chronic and complex medical needs of frail older patients and to provide seamless care for them in the long term.^{63,64} Therefore, older patients often receive suboptimal care due to the fragmented delivery of appropriate treatments and services.⁶⁵

Interventions for frailty

There is no standard treatment of choice specifically for frailty, but there is a need for high quality cost-effective health care strategies to counter frailty.⁶⁶ Although various types of frailty intervention models have been developed and investigated, there is a considerable degree of heterogeneity in terms of optimal intervention type, sample size, population characteristic, setting, baseline frailty status, frailty definition, and outcomes, and most findings are inconclusive.^{67–74} At present, it is therefore not possible to conclude what intervention is the most effective and appropriate. Overall, multi-domain intervention trials, which have been frequently conducted,^{75,76} and many of which included an exercise component, seemed to have some favorable effects (although not in all trials) compared with mono-domain interventions or the control.^{73,77} Among the various outcome measures, functional ability, disability, and falls have been commonly examined while only a limited number of trials investigated changes in frailty status as an outcome.⁷⁸ Although it is still not clear which frailty intervention is the most effective, exercise programs, especially multicomponent exercise including resistance training, have been consistently successful and seem likely to play a pivotal role in frailty interventions.^{79–84}

Implications and challenges for health care policy

One of the plausible implementations of frailty into clinical practice is to identify frail patients using electronic health record data.^{85–87} In a UK study, Clegg et al developed the electronic Frailty Index (eFI) from 36 deficits,⁸⁸ based on the Frailty Index of cumulative deficit model.¹⁷ The eFI was automatically populated from routinely collected data stored in the existing primary care electronic health record where general practitioners (GPs) list all patient diagnoses.⁸⁸ The authors showed eFI was able to stratify patients according to the degree of frailty and had robust predictive validity for mortality, hospitalization, and nursing home admission.⁸⁸ In 2017, NHS England started to require GPs to identify patients aged 65 years or older with moderate and severe frailty using validated frailty instruments including eFI, which is now freely available at most of GP practices.⁸⁹ Following clinical assessment, patients with severe frailty

are monitored using an annual medication review and other clinically relevant interventions if appropriate.⁸⁹ This is probably the first attempt of nation-wide population-based frailty risk stratification and health utilization predictions in health care systems.⁹⁰

Population-based screening for frailty could be expensive and resource intensive, and currently there is no clear evidence for potential benefit, cost-effectiveness, or improved outcomes.⁹¹ Nonetheless, at the Frailty Consensus Conference in 2012, it was concluded that screening for frailty should be recommended for people with specific conditions or in certain settings.⁹² One of the four consensus points was that those aged 70 years or older and those with significant weight loss ($\geq 5\%$) due to chronic disease should be screened for frailty.⁹² This recommendation is supported by the ADVANTAGE initiative, which advocates opportunistic frailty screening of people aged over 70 years receiving health care at any level of the system.¹⁴ The French Society of Geriatrics and Gerontology suggests that people aged over 75 years who do not have difficulty with simple ADL but with early IADL would be good candidates for screening.⁹³ The UK practice guidelines for frailty published from the British Geriatrics Society, Age UK, and Royal College of General Practitioners in 2014 recommend conducting a frailty assessment using all the encounters between health and social care staff and older people in community and outpatient settings.⁹⁴ Research and development efforts aimed at establishing and disseminating best practice in frailty should not lack policy attention to older people with early (pre-) frailty that misses an opportunity to address some demands on health and social care services.⁹⁵

Among the current challenges in the field of frailty research, one of the most important issues is the lack of an international standard definition of frailty.^{92,96} Despite accumulated research evidence on frailty, the variability in frailty definitions used in existing studies influences interpretation of the evidence, comparison with other studies, generalization of findings, and its implementation in the health care policy. In order to further advance and improve the health care services for frail older adults, it is imperative to come to an agreement in terms of frailty definition.⁹⁷ Ideally, the definition should be not only reliable but also feasible and easy to apply.⁹⁸ Based on the currently available evidence on frailty intervention, there is strong evidence that exercise is central and possibly the optimal treatment of frailty. This needs to be explored further through multi-domain interventions that include exercise. The best timing for frailty intervention is not known but could range from intervening proactively to decrease risk of developing frailty or targeting those who are

found to be prefrail or frail at the time of screening. If these concerns are properly addressed, widespread application of public health approaches will be possible, including screening, identification, and treatment of frailty, resulting in better care and healthier aging for older people. Involving frail older people in exploration of responses to frailty is likely to be fruitful; a Swedish study showed that financial situation, self-rated health, and social networks were determinants of life satisfaction. Actions that benefit life satisfaction – social and financial support – should be promoted.⁹⁹

Another important area of frailty research is education and training. In order to deliver high quality care and services effectively and efficiently to frail older adults, health care professionals including physicians, nurses, and other medical workers need to understand basic principles of care for frail older adults and to be able to detect frailty and provide treatment/interventions. Different understandings of frailty may impede communication between disciplines and need to be addressed. However, the evidence on education or training for frailty management is lacking. A recent systematic review that involved searches until May 2017 found no relevant article on education and/or training interventions for health care professionals in the field of frailty.¹⁰⁰ There are currently ongoing frailty projects including educational components targeting health care professionals, patients, and caregivers, and new findings from these projects are expected to contribute to the field of frailty.^{14,100}

There is an increasing interest in frailty in other medical fields than the geriatrics.^{101,102} One example is that frailty has recently been pursued as a potential risk assessment measure for older surgical patients and has shown to be promising in predicting post-operative complications, such as mortality or length of hospital stay.¹⁰³ However, the lack of knowledge about frailty is a major barrier to the preoperative frailty assessment by surgeons, which may be addressed by education and training.¹⁰⁴ A US educational interventional study involving cardiothoracic surgery residents showed that online short courses on frailty significantly improved residents' knowledge of frailty and influenced surgical risk estimates.¹⁰⁵

Finally, frailty research may have evolved without taking into account the patient perspective. Frailty can be considered as a highly negative term and being labeled as frail may affect negatively the most vulnerable individuals in various ways. Those who were labeled as “old and frail” by others were more likely to be associated with a loss of interest in social and physical activities, poor physical health, and increased stigmatization.¹⁰⁶ The future research and development efforts need to acknowledge the risks of labeling older people in

stigmatizing ways, and avoid frailty from becoming the new cloak of ageism and a tool for discrimination.¹⁰⁷

Conclusion

There is an urgent need to identify and implement effective long-term care schemes to meet the complex demands of older adults. Frailty is potentially a perfect fit as a risk stratification paradigm and has therefore been recognized as an emerging public health priority.¹³ Although a growing number of frailty studies have been conducted over the last two decades, their findings have not yet been fully translated into clinical practice¹⁰⁸ and the implementation of evidence on frailty in health care policy-making is further underrepresented.⁹⁵ Successful implementation has the potential to improve quality of care for frail older adults and promote healthy aging as well as diminish the impact of frailty on health care systems and strengthen their sustainability. Such actions further demonstrate the substantial public health importance of frailty. Given the multidimensional and heterogeneous nature of frailty and the complex care needs of frail older adults, a multidisciplinary collaborative approach is needed between researchers, clinicians, policy makers, and older people themselves to improve the health and well-being of this subgroup of older adults.^{109,110} The field of frailty is still evolving and expanding and will need much more time and effort for further progress to occur.⁹⁶ Better outcomes for older people are likely to come with a time lag, and addressing frailty may require a massive cultural (perhaps generational) shift in the organization of health and care systems.⁹⁰

Disclosure

The authors report no conflicts of interest in this work.

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