

## Frailty index - Assessment Tools in elderly: feasibility in India

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### Abstract

Frailty is associated with advanced chronological age and chronic disease but is a separate construct. The measurement of frailty has received significant attention in recent geriatric medicine literature, with various models proposed to predict the risk of poor outcomes. Here, in this article different assessment tools has been reviewed to the definition of frailty, focusing on the conceptualization of frailty index as the failure of a complex system. We explore how far it is feasible in India and what can be done.

**Keywords:** Elderly, Frailty index, Assessment tools, India.

### Introduction

The significant increase in an aging has resulted in rising proportions of elderly peoples in the total world population with profound impact on economic, political, and social processes. The old age cannot be defined exactly because it does not have the same meaning in all countries and societies. In January 1999, Government of India adopted 'National Policy on Older Persons' which defines 'senior citizen' or 'elderly' as a person who is of age 60 years or above.<sup>(1)</sup> In India the total population of elderly were 8.2% in 2011, which is expected to increase over the next four decades to 19% in 2050.<sup>(1)</sup>

People aged above 60 years are three times more likely to be admitted to hospital than other age groups and occupy around two-thirds of average hospital beds.<sup>(2)</sup> Elderly patients with multisystem complaints are not confined to only Geriatric Medicine units but are scattered throughout general medical wards.<sup>(3)</sup> Although many do well and are discharged home to live independently, those age groups remain a vulnerable group, at high risk of prolonged hospital stays, morbidity and death. It is therefore important that all physicians should have the knowledge and skills to care for these patients effectively.

Although there is agreement that frailty is a useful concept for clinical researchers, consensus has not been attained on a single definition and different ones are available in the literature depending on the features used to describe it. Definite and easy to understand biological and clinical markers for frailty are not available and so various operational definitions are there to explain the syndromic nature of the condition making the things more complex. The prevalence of frailty in the elderly people range from 33% to 88% depending on the criteria used.<sup>(4,5,6)</sup>

Even if exact nature of frailty is debatable and there are various differences in definition and its measurement, there is no disagreement on its appalling consequences for the elderly persons, their families and the society as a whole. It is important that when people

are frail, only a minor life incident make them from independence to dependence.

The relationship between frailty and chronic diseases is complex and poorly understood. Important though to research and to clinical practice is that the development of acute and chronic diseases can precipitate frailty because reacting to them requires the organism to mobilize its available resources and exhausts the reserve functions of the body.

European Innovation Partnership partners have agreed on defining frailty for the purpose of a more operational implementation of their action plan as: "Older adults who are at increased risk for future poor clinical outcomes, such as development of disability, dementia, falls, hospitalisation, institutionalisation or increased mortality".<sup>(5,7)</sup> Following on this broad approach to frailty, several other domains of frailty are covered specifically by the partners' commitments such as physical decline, cognitive decline, nutrition and physical activity. Due to the nature of frailty in itself, no clear borders can always be established and overlapping exists within this groups.<sup>(8)</sup>

Generally aging reflects the longer and partly healthier lives of the persons; at the same time it is associated with chronic and degenerative diseases leading to disability which can limit the quality of life. So in the elderly, it is an important health indicator that can have heavy social impact with long-term hospitalization and increased use of medical care.<sup>(8)</sup> In addition, as people age there are increased chances of becoming fraile, thence increased chances of deterioration with decreased likelihood of recovering from this frailty.<sup>(9)</sup> The prevalence of frailty in community-dwelling Europeans (>65 years) varies between 5.8% and 27.3%; in addition, between 34.6% and 50.9% are classified as 'pre-frail'.<sup>(10)</sup>

The prevalence of frailty increases with chronological age and there is likely to be an age point, say 95 years, at which all individuals are vulnerable to adverse outcomes.<sup>(11)</sup> Similarly, co-morbidities can

incur vulnerability and some chronic diseases are associated with very high frailty levels.<sup>(12)</sup>

In the face of the rapid population ageing occurring in Western societies, frailty is set to reach epidemic proportions over the next few decades. In India, though frailty is much higher as expected, no such studies and data are available. Literature search were done from Cochrane library, pubmed, scopus, medlar, indmed, indexcopernicus and google scholar.

Issue of concern within geriatric population is the concept of frailty, frailty index or frailty syndrome which still needs lots of research. Here, we briefly review different approaches to the definition of frailty, focusing on the conception of frailty as the failure of a complex and vaguely defined system. We describe the difficulties of recognizing and measuring frailty in clinical practice. By considering the impact of frailty on geriatric population, we explore how an understanding of frailty can improve clinical care in the hospital setting.

### **Frailty: Definition**

The term 'frail' is contemplated to identify vulnerable elderly people at high risk of adverse outcomes including falls, morbid disability, hospitalization and mortality. Yet, frailty is not synonymous with either age or disease. Frailty should be defined, as a means to summarize health status and useful clinical information for elderly patients with advanced single- or multi-organ disease processes.

Frailty is defined as the loss of a person's ability to withstand minor environmental stresses because of reduced reserves in the physiological function of several organ systems.<sup>(13)</sup> There are at increased risk of morbidity and mortality, because they do not have the reserves to respond and maintain adequate homeostasis. In functional terms, frailty is defined as dependence on others for activities of daily living (ADLs)—bathing, dressing, feeding, continence, toileting and mobility. Both frailty and disability frequently coexist and the prevalence increases with increasing age. Impaired cognitive function may add to the complexity of the situation.<sup>(14)</sup>

The most widely accepted criteria are those of Fried et al, who define Frailty Syndrome as including three or more of the following: weakness, slow walking speed, self-reported exhaustion, low physical activity, and unintentional weight loss.<sup>(15)</sup>

### **Assessment tools for frailty index**

Several assessment tools based on different conceptual approaches and validated in different settings and populations have been developed to detect frailty, and their predictive validity for mortality has also been established.<sup>(16)</sup> The different instruments or assessment tools, based on different conception of frailty, however, capture different groups of older patients.<sup>(17)</sup> This is particularly problematic evaluating

hospitalized older patients because prognostic information would be extremely useful in setting standard guidelines for care management, and follow-up after hospital discharge, and test their effectiveness.<sup>(18)</sup>

Most common instruments, corresponding to the updated most widely accepted conceptual definitions of frailty, in the prediction of all-cause mortality of hospitalized older patients are – a) For the phenotypic model, the frailty index derived from the Study of Osteoporotic Fractures (FI-SOF), b) Frailty index in the Cardiovascular Health Study (FI-CHS), c) frailty index based on the cumulative deficits (FICD) the model described by Kulminski and colleagues,<sup>(20)</sup> d) frailty index based on a Comprehensive Geriatric Assessment (CGA) (FI-CGA) and e) Multidimensional Prognostic Index (MPI).<sup>(19-23)</sup>

### **Frailty index in the Cardiovascular Health Study (FI-CHS)**

This index developed by Fried and colleagues is an operational definition of frailty in older subjects based on the presence of any three of the following five characteristics: shrinking, weakness, poor endurance, slowness, and low physical activity, so suggesting a phenotypic model of frailty.<sup>(15)</sup>

### **Frailty index derived from the Study of Osteoporotic Fractures (FI-SOF)**

This FI-SOF was recently proposed by Ensrud and colleagues as a simpler index that might be more suitable for assessing frailty in a clinical practice setting.<sup>(19)</sup> It was calculated on the basis of the following three items: a) unintentional weight loss, i.e., not due to diet or exercise, of more than 4.5 kg during the last year; b) inability to rise from a chair five times without the use of arms; c) low energy level as evaluated by the answer to the question "did you feel like you could not get going?"; those who reported that this feeling had occurred three days or more in the previous week were considered as demonstrating low energy level. Frailty status was defined as robust (0 components), prefrail (1 component), and frail (2 or 3 components) and expressed in three grades from grade 1 to grade 3 of frailty.

### **Frailty index based on cumulative deficits (FI-CD)**

Another conceptual approach to frailty suggests that an index based on health/well-being disorders (e.g., signs, symptoms, impairments, abnormal laboratory tests, diseases, etc.) accumulated by individuals during their life course can be considered as indicators of physiological frailty. This was calculated considering a set of 32 deficits: difficulty with eating, dressing, walk around, getting in/ out bed, getting bath, toileting, using telephone, going out, shopping, cooking, light house work, taking medicine, managing money, arthritis,

Parkinson's disease, glaucoma, diabetes, stomach problems, history of heart attack, hypertension, history of stroke, flu, broken hip, broken bones, trouble with bladder/bowels, dementia, self-rated health, as well as problems with vision, hearing, ear, teeth, and feet. To calculate the index it is necessary to count the number of such deficits divided by the total number of all potential deficits considered for a given person.

### Frailty index based on a Comprehensive Geriatric Assessment (FI-CGA)

This was calculated by counting the number of impairments identified in ten domains: 1) cognitive status; 2) mood and motivation, rated separately and then combined so that the highest level of specificity was scored for the domain; 3) communication, i.e. vision, hearing and speech; 4) mobility and 5) balance (each of the latter two scored at the highest level of independence also with the use of mobility or balance aids); 6) bowel function; 7) bladder function; 8) ADL and IADL rated as no impairment= no problem, IADL impairment= mild problem, ADL impairment =major problem; 9) nutrition, and 10) social resources, scored as a problem if there was need for additional help. Problems in each domain were scored as 0= no problem, 1= minor problem, or 2 =major problem. The

FI-CGA was expressed in three grades of frailty, i.e. FI-CGA 1= mild, FICGA 2 = moderate and FI-CGA 3= severe; the cut-off for mild, moderate and severe frailty were respectively 0–7, 7–13, and 13.

### Multidimensional Prognostic Index (MPI)

Multidimensional and CGA based model of frailty the MPI were calculated from information on eight domains including: 1) functional status assessed by the ADL and the IADL scales; 2) cognitive status assessed by the Short Portable Mental Status Questionnaire (SPMSQ); 3) comorbidity as assessed by the Cumulative Illness Rating Scale (CIRS); 4) nutritional status according to the Mini Nutritional Assessment (MNA); 5) the risk of developing pressure sores assessed by the Exton Smith Scale (ESS); 6) the number of drugs taken by patients at admission and 7) co-habitation status, i.e. alone, in family or in institution. For each domain a tripartite hierarchy was used, i.e. 0= no problems, 0.5= minor problems, and 1= major problems. The final MPI was expressed as three grades of risk of all-cause mortality: MPI-1 low risk (MPI value <0.33), MPI-2 moderate risk (MPI value between 0.34 and 0.66) and MPI-3 severe risk of all-cause mortality (MPI value >0.66).

**Table 1: Showing methodological constructs of the four different frailty instruments**

Frailty index	Evaluated parameters	Frailty determination	Conceptual approach
FI – SOF Frailty index derived from the study of osteoporotic fracture	3 items 1. Unintentional weight loss 2. Inability to rise from a chair five times without the use of arms 3. Low energy levels	Robust; 0 component, Prefrail 1 components Frail 2 or 3 components. Only grading available.	Phenotypic
FI-CD Frailty index based on cumulative deficits.	22 items Difficulty with Eating, Dressing, Walk around Getting in/ out bed, Getting bath, Toilet, Using telephone, Going out/ Shopping Cooking, Taking medicine Managing money, Arthritis/ Parkinson's disease, Diabetes, Hypertension, h/o heart attack, stroke, h/o fracture bone, dementia, self-rated health as well as problem with hearing, vision, teeth.	No grading available. Sum of the presence of deficit divided by total number of all potential deficit.	Accumulation of deficits
FI- CGA Frailty index based on a comprehensive geriatric assessment.	9 domain Cognitive status Mood and motivation Communication Mobility /Balance Bowel function/ Bladder function Activities of daily living and Nutrition	Problem in each domain were score 0 no problem 1 minor problem 2 major problem. The cut off for mild, moderate and severe frailty were 0-7, 7-13 and > 13.	Multidimensional
FI- MPI	8 domains: 1) basal ADL; 2) IADL; 3) cognitive (SPMSQ); 4) comorbidity (CIRS); 5) nutrition (MNA); 6) risk of developing pressure sores (ESS); 7) the number of drugs taken by patients at admission; 8) co-habitation status	0= no problems, 0.5= minor problems and 1= major problems. The sum was divided by the total number of the domains. The final MPI was expressed as three grades of risk of all-cause mortality:	Multidimensional

		low risk (value #0.33), moderate risk (value between 0.34 and 0.66) and severe risk (value .0.66)	
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### Feasibility in India?

Though several instruments/tool assessments are available as well as validated in western world, they are basically based on different conceptual approaches and done in different settings and different groups of older patients. Moreover in hospitalized older patients there is bigger problems in evaluation because prognostic information are required in setting standard guidelines for care management, follow-up after hospital discharge, and test their effectiveness. All these are very difficult in India especially in rural population as follow up is lost very often, lack of basic information, social hindrance and illiteracy.<sup>(24,25)</sup>

It is feasible and necessary to identify pre-frail older people in the community, to identify frail older people in the clinical setting and to deliver an intervention programme. These tasks should be targeted to the components of frailty and be evidence based and tailored to the setting.

The most evidence-based process to detect and grade frailty is the so call Comprehensive Geriatric Assessment. However, this is a resource consuming process which beckons the need to find equally reliable but more efficient ways for routine screening in health care settings and nursing homes.

There is absence of clear biological and clinical markers for frailty and further research is needed in this area. It is useful and efficient to implement guidelines and protocols to support decision making of health professionals.

At present, most of the geriatric outpatient department services are available at tertiary care hospitals in India. Since 75% of the elderly reside in rural areas, it is mandatory that geriatric health care services be made a part of the primary health care services.<sup>(7)</sup> This calls for specialized training of medical officers and other paramedics in geriatric medicine.

### What intervention should be done?

- A better and simple methodology for the screening and identification of pre-frail status in older patients.
- The prevention of factors such as malnutrition or lack of regular physical activity that have impact on different components of the frailty syndrome.
- Evidence based interventions through appropriate pathways of health and social care to avoid incident frailty, its progression to disability and its consequences, including unnecessary hospitalizations.
- The development of basic research on different aspects of frailty, cognitive decline, malnutrition

and quality of life of frail older people and their caregivers.

- Alerting the health care and social systems on the need to screen and prevent pre-frail status and manage and care frailty patients once it has been settled.
- Developing more efficient methods to detect frailty and to measure its severity.
- Preventing iatrogenic hospitalization (escapism for the relatives) of frail older patients and providing them adequate and human care at home or at nursing homes.
- Detecting pre-frailty stages in robust older people.
- Developing research lines to capture the syndromic nature of frailty and opening lines for future prevention and treatment opportunities.
- Most important parameter should be...“Don’t talk about me without me.”

### Conclusion

The development of a consistent and practical system would facilitate communication with patients and their relatives and could help reduce the subjectivity often associated with the designation of the label ‘frail’ to older individuals. A system with robust predictive abilities for adverse outcomes would lend much needed evidence-based support to the frequent use of frailty in making treatment decisions. When frailty can be measured with precision, we can start to explore which interventions are most beneficial for patients according to their different levels of resilience. More research is needed to simplify the assessment tools for frailty in India especially rural population.

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