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THE I.A.N.A. TASK FORCE ON FRAILTY ASSESSMENT OF OLDER PEOPLE IN CLINICAL PRACTICE

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Abstract: Frailty is a commonly used term indicating older persons at increased risk for adverse outcomes such as onset of disability, morbidity, institutionalisation or mortality or who experience a failure to integrate adequate responses in the face of stress. Although most physicians caring for older people recognize the importance of frailty, there is still a lack of both consensus definition and consensual clinical assessment tools. The aim of the present manuscript was to perform a comprehensive review of the definitions and assessment tools on frailty in clinical practice and research, combining evidence derived from a systematic review of literature along with an expert opinion of a European, Canadian and American Geriatric Advisory Panel (GAP). There was no consensus on a definition of frailty but there was agreement to consider frailty as a pre-disability stage. Being disability a consequence rather than the cause of frailty, frail older people do not necessary need to be disabled. The GAP considered that disability (as a consequence of frailty) should not be included in frailty definitions and assessment tools. Although no consensual assessment tool could be proposed, gait speed could represent the most suitable instrument to be implemented both in research and clinical evaluation of older people, as assessment of gait speed at usual pace is a quick, inexpensive and highly reliable measure of frailty.

Introduction

Frailty is a commonly used term indicating older persons at increased risk for adverse outcomes such as onset of disability, morbidity, institutionalisation or mortality or who experience a failure to integrate adequate responses in the face of stress. Unfortunately frailty has often been poorly or variably defined in medical literature. Although there is a universal recognition of the frailty syndrome by most physicians caring for older people, there is still a lack of both consensus definition and consensual clinical assessment tools. This failure is one of the major barriers for efficient primary or secondary preventive measures. Even more, frailty is a dynamic condition and frail elderly people can transit to non-frail but can also become definitely frail if no specific interventions are implemented.

It is nowadays widely recognised that frailty should be considered as a clinical syndrome resulting from multisystem impairments separated from the normal aging process. At least, chronic and acute diseases, and/or the physiological decline that occur during the aging process frequently contribute to frailty, along with a dysregulation in the metabolic balance of inter-related systems, like the immune system with cytokine overexpression or the neuroendocrine system with hormonal decline. This complex clinical profile of frail elderly people is one of the reasons why it is so difficult to assess frailty with a single or simple clinical tool. As a syndrome, associated impairments such as sarcopenia, functional decline, neuroendocrine dysregulation and immune impairments can occur in combination. The cluster of clinical manifestations of frailty is probably at greater risk for adverse outcomes than any single component and no single manifestation of frailty will explain the whole of symptoms and signs present. Although, there is growing evidence of these underlying contributing factors to enter the frailty state, defining frailty in clinical practice and clinical research remains paradoxically difficult. (1-6)

Many authors consider the frailty syndrome as a continuum from normal ageing to a final state of disability and death, presenting as intermediate states the pre-frail and the frailty syndromes (see figure 1). From this point of view, primary interventions for older persons at risk could be established to prevent "entering" a frailty syndrome (pre-frail state) or even more, the implementation of secondary interventions could render the frailty syndrome at its initial stages reversible and prevent functional decline. Taking these considerations into account it seems a high priority to identify the frail population by establishing the definition and assessment tools of frailty.

Before organizing appropriate treatment and preventive measures of the underlying causes of frailty, the identification of frailty with an appropriate tool should be the first step to be taken. With no consensus on the definition and components of frailty, this assessment (including the tool used) is extremely heterogeneous. A frailty assessment tool to identify the population at risk, easy to use in clinical settings, quick, cheap and reliable could be relevant in daily practice. Because frailty is approached as a major primary outcome in future randomised controlled trials (RCTs), this measure should also demonstrate high reliability and validity

The aim of the present manuscript is to perform a comprehensive review of the definitions and assessment tools

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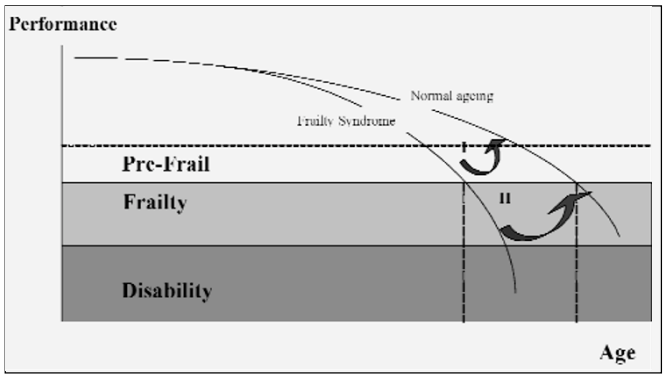
on frailty in clinical practice and research, combining evidence derived from a systematic review of literature along with an expert opinion of a European, Canadian and American Geriatric Advisory Panel (GAP), who met in Barcelona, Spain in May 2007.

Figure 1
The Frailty Syndrome



I stands for primary interventions and II for secondary interventions

Historical background

The concept of frailty has been present in geriatric literature for many years. Stamford and colleagues in 1972 used the term synonymously with institutionalisation. The term failure to thrive, long equated to frailty, was introduced by Brown and colleagues in the late 1980s. Failure to thrive was a diagnosis that described weight loss along with cognitive and functional decline stated to occur near the end of life. Brockelhurst in 1985 used a balance between biomedical and psychosocial components to elaborate a dynamic model of frailty. Stone and colleagues, in 1987, used the terms frailty and disability as interchangeable terms in an article on caregivers of frail elderly. In 1988, Woodhouse and colleagues defined frailty as those more than 65 years of age who depend on others for the activities of daily living and in the same line, Gillick and colleagues reported frailty as old debilitated individuals who cannot survive without substantial help from others. In 1994, Rockwood proposed a practical definition of frailty as those who depend on others for the activities on daily living (ADL) or who are at high risk of becoming dependent. (7-10)

It was not until 1998 that a "modern concept of frailty" was proposed with the Alameda County Study (cohort of 6928 persons aged 65 and older at inclusion) performed by Strawbridge and colleagues, assessing frailty through 16 variables of 4 functional domains: physical, nutritive, cognitive and sensory functioning. Participants were considered frail if they had impairment in 2 or more domains. (11)

Although it was in the seventies, that we find the first articles published on frailty, it was not until the late nineties that we recognise the actual trends in frailty research and that we find an explosion of the articles published on the topic. A PUBMED search made by Hogan and colleagues, found that the number of publications containing the Medline MeSH term "frail elderly" had increased exponentially over the last 20 years. (6) But even after 30 years of research, many papers propose new definitions, further physiopathological relationships and different assessment tools. These considerations make frailty a relatively new and evolving concept, depending on study populations, authors' approaches and methods adopted to define frailty. Hence, definitions and assessment tools of frailty are still not consensual. The lack of an adequate evidence base for a single definition and clinical assessment tool means that the nature of frailty is and remains an active area of enquiry.

Methodology

PUBMED search

A search with the MeSH terms, Frailty / Frailty-Definition / Frailty-Assessment / frailty and elderly-older people was performed in order to obtain relevant articles published in the domain. The reference lists of all identified papers and review articles related to the topic were also searched for relevant articles. The members of the GAP additionally supplied articles of special interest. Forty-one articles were selected for the purpose of this review.

Geriatric Advisory Panel meeting

A preliminary draft of definitions and assessment tools of the selected 41 articles was performed before the meeting by Abellan G, Rolland Y and Vellas B. During the meeting, draft was revised and expert opinion in the field of frailty was focused on the aim of obtaining consensual definition and assessment tools of frailty.

The concept of frailty

Although many definitions of frailty have been proposed, none is considered "Gold Standard". From the phenotype of physical frailty to much broader definitions including cognitive, functional and social circumstances going well beyond just physical aspects, the definition for frailty is far from consensual and probably more than one definition could be considered nowadays valid. As an example, van Iersel et al. reported in a sample of 125 elderly people a prevalence of frailty ranging from 33% to 88% depending on the criteria used. (12)

The domains of Frailty

Domains, diagnostic criteria, assessment tools and obviously the definition of frailty will change depending on the model of frailty adopted. As part of a syndrome all the domains included in the frailty model must have a plausible link to the underlying biological pathway. In order to obtain a consensual definition, the domains of frailty need to be settled. Two main phenotypes as a result of domain aggregates nowadays co-exist in scientific

literature:

a) "Physical phenotype": Widely used criteria include shrinking (weight loss, sarcopenia), weakness, exhaustion (poor endurance), slowness and low activity. Clusters of physical impairments shape frailty and no other non-physical components are considered.

b) "Multi-domain phenotype": There is also a strong evidence for the inclusion of additional components such as cognition and mood which may be affected by the same biological processes that lead to the manifestations of "physical frailty"; moreover the utilisation of weight loss might underestimate the prevalence of frailty in the obese. Further, many authors believe that variables such as sensory impairment, poor social conditions, chronic diseases and disability must be included as domains of frailty.

Three working-groups have previously suggested specific domains of frailty:

a) The Interventions on Frailty working group. (13)

b) American Geriatrics Society /National Institute on Aging Research Conference on Frailty in older adults. (14)

c) Canadian initiative on Frailty and Aging. (6,15)

Cohort based definitions of frailty (Table 1)

Fried Criteria

Based on their work in the Cardiovascular Health Study (CHS) and the Women's Health and Aging Studies (WHAS), Fried and colleagues presented an operational definition of frailty. The definition conceptualises frailty as a syndrome of decreased resiliency and reserves, in which a mutually exacerbating cycle of declines across multiple systems results in negative energy balance, sarcopenia, and diminished strength and tolerance for exertion. Accordingly, exhaustion, weight loss, weak grip strength, slow walking speed, and low energy expenditure were proposed as frailty-identifying characteristics. They found a prevalence of frailty of 7% in the CHS (4317 community-dwelling adults aged 65 and over), 30% in the subgroup of 80 and older, and 28% in the WHAS (moderately to severe disabled population of 1002 community-dwelling women aged 65 and over) (16, 17, 18).

Many other investigators performed secondary analyses, using modified Fried criteria. The differences in the prevalence of frailty observed are linked to methodological issues (Fried criteria were adapted to the variables available in their respective trials) and differences in the study population. So, in the Invecchiare in Chianti Study (InCHIANTI study), Ble and colleagues found a prevalence of frailty of 6.5% in a sample of 827 older (>65 years) people. [19] The Women's Health Initiative Observational Study (WHI-OS) of 40657 women aged 65 to 79 at baseline permitted Woods and colleagues to find prevalence of 16.3%. The criteria used predicted several poor outcomes like death, hip fracture, disability and hospitalisation after an average follow-up of 5.9 years. [20] In the Hispanic Established Population Epidemiological Study of the Elderly (EPESE), Ottenbacher and colleagues found a prevalence of 20% of frailty after evaluating 621 non-institutionalised Mexican American older people (aged 70 and over) and cognition was found to be related to frailty in men but not in women. Their results pointed out the need to consider the impact of frailty on cognitive function, and cognition on frailty, as cognitive measures are not usually included in measures of frailty. (21)

Functional and cognitive impairments

Functional impairments have been used to define and assess frailty based upon degrees of disability. Gill and colleagues identified frailty on a physical phenotype as older persons with substantial impairments in physical abilities and hence with high projected rates of disability and functional decline. Frailty was evaluated by a walking speed test and a chair stand test. Persons with one criteria were considered moderately frail and those meeting both, severely frail. Diagnosis of dementia was an exclusion criterion. (22)

Rockwood and colleagues compiled a Frailty Index based on impairments in cognitive status, mood, motivation, communication, mobility, balance, bowel and bladder function, activities of daily living, nutrition and social resources, as well as a number of comorbidities. This index, with 4 levels from fitness to frail, was found to be highly predictive of death or institutionalisation. (23) The Canadian Study of Health and Aging (CSHA) permitted Rockwood and colleagues to propose frailty as a multidimensional syndrome of loss of reserves (energy, physical ability, cognition and health) that gives rise to vulnerability. (24) Frailty was assessed by the CSHA, frailty scale, a 7-point clinical frailty scale based upon a 70-item CHSA frailty index. This tool was found to perform assessment of risk of death in a better way than measures of cognition, function or comorbidity.

Comprehensive Geriatric Assessment

Mitnitski and colleagues constructed a Frailty Index based on 20 deficits observed in a structured clinical examination based upon the Comprehensive Geriatric Assessment (CGA). They found this index to be a predictor of survival with a view of frailty as the failure to integrate the complex responses required to maintain function. (25)

Jones and colleagues also based their frailty index on the CGA. They included 10 standard domains such as cognitive or functional impairment, disability and comorbidity burden to construct a 3 level frailty index permitting risk stratification of future adverse outcomes (institutionalisation or mortality). (26)

Physical performance

In the Zutphen study (a cohort of 450 community dwelling independent men) and the SENECA Study (849 community dwelling older people aged from 75 to 80 years), Chin et al compared three different working definitions of frailty: inactivity plus low energy intake, inactivity plus weight loss

Table 1
Cohort Based Definitions of Frailty

Cohort	Description	Exclusion criteria	Definitions and Assessment Tools	Outcomes
Women's Health Studies (WHAS) [16]	WHAS I: 1002 community-dwelling Women; Aged > 65 years WHAS II: 436 community-dwelling Women; Aged 70-79 years	MMSE under 17 (WHAS I); under 23 (WHAS II)	Modified Fried Criteria: Weight loss: BMI< 18.5; 10% weight at baseline Exhaustion: self reported different questions Low energy expenditure: Minnesota Leisure Time Activity, but different threshold Slowness: walking speed on 4 m	Frail women had higher risk of developing disability and in ADL or IADL, institutionalisation and death, independently of multiple confounders.
Cardiovascular Health Study (CHS) [17]	5317 community-dwelling 65 years and older Follow-up for 7 years	History of Parkinson Stroke MMSE <18 Sinemet Aricept or antidepressants	Fried criteria: Weight loss: >10 lbs in prior year unintentionally Weakness: Grip strength in lowest 20% Exhaustion: self-report by 2 questions CES-D Slowness: 15 feet walking speed Low activity: Short version Minnesota Leisure Time Activity questionnaire Frail: >3 criteria	Predictive association of frailty and incident falls, worsened mobility or ADL disability, incident hospitalisation and death over 3 and 7 years after adjustments
Relationship Vit E and frailty in the Invecchiare in Chianti Study (InCHIANTI) [19]	827 community-dwelling 65 years and older Cross-sectional	Patient affected by cancer or dementia Disability in ADL	Modified Fried criteria: Weight loss: self-reported 4.5 kg in previous year Exhaustion: Italian version of the CES-D Slowness: walking speed on 4 m Physical activity: self-reported physical activity Weakness: grip strength in lowest quintile	Prevalence of frailty: 6.5%
Women's Health Initiative Observational Study (WHI-OS) [20]	40657 community-dwelling Women Aged 65 to 79 Follow-up 5.9 years	Life expectancy < 3 years Not postmenopausal Parkinson Disease Parkinson treatment Depression	Modified Fried Criteria: Detailed physical Function Questionnaire Different exhaustion questions RAND-36 Physical Function Scale Weight loss >5% or self reported >5 pounds unintentionally.	Frailty was found to be strongly and independently associated with risk of death, hip fracture, disability and hospitalisation
Hispanic Established Populations for Epidemiological Study of the Elderly (EPESE) [21]	621 community –dwelling Aged 70 and older 1 year follow-up		Modified Fried criteria: Weight loss: unintentional weight loss > 10 lbs Exhaustion: CES-D scale Walking speed: 8-foot walk Grip strength: as for CHS Score of 2, 3 or 4: frail	Variables predicting frailty: Upper extremity strength, comorbidities and MMSE in men Lower extremity strength, BMI and disability in women Disability (ADL/IADL) best single predictor
Precipitating Events Project (PEP) [6]	754 community-dwelling Age >70 years Follow-up 54 months (4.5y)	Significant cognitive impairment Inability to speak English Terminal illness	Modified Fried Criteria: weight loss, exhaustion, low physical activity, muscle weakness and slow walking speed	Frailty transitions by assessment of frailty every 18 months for 54 months
Home based intervention program [22]	188 community dwelling 75 and older 1 year follow-up RCTs	Unable to walk Dementia Life expectancy of less than 12 months Stroke, hip fracture Myocardial infarction Hip or knee replacement in previous 6 months	10 feet walking test and back as quick as possible Stand up from seated position with arms folded	Home-based intervention program for frail older people Improvement of ADL
Canadian Study of Health and Aging (CSHA) [24]	2305 community-dwelling and institution 75 and older 5 years of follow-up		The CSHA Clinical Frailty Scale: 1. very fit / 2. well / 3. well with treated comorbid disease / 4. Apparently vulnerable / 5. Mildly frail / 6. Moderately frail / 7. Severely frail.	Clinical Frailty Scale predict mortality and institutionalisation

Table 1 (following)

Cohort	Description	Exclusion criteria	Definitions and Assessment Tools	Outcomes
Canadian Study of Health and Aging (CSHA) [25]	2914 community dwelling and institution 65 and over		Failure to integrate the complex responses required to maintain function Frailty Index List of 20 deficits (signs, impairments, symptoms or disabilities) observed after a structured clinical examination based upon CGA	Predictor of survival
Mobil Geriatric Assessment team Trial (MGAT) [26]	169 community dwelling 1 year follow-up 70 and over		Vulnerable state of health, arising from the complex interactions of medical and social problems, resulting in a decreased ability to respond to stress, and associated with a decline in functional performance Frailty Index, FI-CGA Based upon impairments assessed by CGA, 3 levels of frailty: Mild, Moderate and Severe	Predictor of adverse outcomes (institutionalisation or mortality)
Zutphen Elderly Study [28] Seneca Study [27]	849 community dwelling aged from 75 to 80 years 450 community dwelling men aged 69 to 89 3-year follow-up		Three different working definitions of frailty: Inactivity (auto-questionnaire) plus low energy intake Inactivity plus weight loss Inactivity plus low body mass index	Combination of inactivity and weight loss: Predictive of death and functional decline over 3 years Less favourable health and nutritional characteristics Poorer physical functioning
Prospective cohort Veterans affair (VA) network site and a Medicare Health management organisation (MHO) [30]	487 community-dwelling 65 years and older Follow-up: 36 months	MMSE under 24 Unable to walk 4 meters Extremely fit or extremely frail	Gait speed Short Physical Performance Battery, SPPB: Gait speed, time to walk at usual pace 4 meters Repeated chair stands: 5 chair stands as quick as possible Tandem balance: progressive challenging stands	Both measures estimates of future risk for hospitalisation and decline in health and function
The Epidemiology of Osteoporosis Study (EPIDOS) [32]	7364 community dwelling Women aged over 75 years Cross-sectional baseline data	Femoral neck fracture or hip replacement Institution at baseline	IADL: use of public transport, housework, shopping, washing, cooking, medication management, use of telephone and money management.	Impairment in al least one IADL predicts frailty
The Epidemiology of Osteoporosis Study (EPIDOS) [36]	7364 community dwelling Women aged over 75 years 4 years follow-up	Femoral neck fracture or hip replacement Institution at baseline	SPPB Grip strength Gait speed	The 3 measures predicted death during follow-up
Syddall [37] disability, Bautmans [38]	717 community dwelling Aged 64-74 4 years follow-up 40 community dwelling 65 and over	Acute or chronic inflammation MMSE < 23	Grip strength	Grip strength, a useful single marker of frailty, was a powerful predictor of self-perceived fatigue, morbidity and mortality
Toulouse 91 Toulouse 93 Albuquerque 93 [39]	566 older patients from different settings		Mini Nutritional Assessment, MNA	Score between 17 and 23.5 appeared to be a marker of frailty and was well correlated with weight loss, poor appetite, functional and cognitive decline and adverse outcomes
The Reseau de la maladie d´Alzheimer France prospective study (REAL.FR) [40]	687 community dwelling follow-up: 4 years	Institution at baseline Severe Dementia (MMSE<12) No formal caregiver	One-Leg Balance	Abnormal one-leg balance test predicted disability, institutionalisation, mortality and cognitive decline

and inactivity plus low body mass index. The combination of inactivity and weight loss was the most predictive of death and functional decline over 3 years. (27, 28) Chin noted that physical inactivity in combination with weight loss seems to be a practical and inexpensive screening criterion for identifying a subgroup of elderly with less favourable health and nutrition characteristics and poorer physical functioning.

Pursuing the same approach of physical frailty, Studenski and colleagues, found that the EPESE Short Physical Performance Battery (SPPB) independently predicted decline in function, hospitalisation and global decline in health in older patients seen in primary care (cohort of 487 older people aged 65 and older). (29,30) In a second article, the author proposed a physical frailty definition based upon measurements of meaningful changes in physical frailty in order to capture clinical anchors for prevention and treatment. The assessment tool used was the Clinical Global Impression of Change in Physical Frailty (CGIC-PF) instrument. (31)

Others

From the EPIDOS study, a cohort of 7364 community-dwelling elderly women, Nourhashemi and colleagues demonstrated a relationship between impaired instrumental activities of daily activities (IADL) and frailty. The proposed definition of frailty was a syndrome in which combinations of biological, physiological, social and environmental changes occur with advancing age. Women with disability in at least one IADL were frailer because they had more associated disorders, poorer cognitive function and more frequent falls. (32)

Blaum and colleagues evaluated baseline data from the WHAS of a subpopulation of 599 women with a BMI greater than 18.5 kg/m^2. Considering frailty as a wasting disorder, obesity is less obviously associated with frailty. They applied Frieds' criteria of frailty to this subpopulation, finding that overweight was significantly associated with prefrailty syndrome (presence of 1-2 frailty criteria) and obesity was associated with prefrailty and frailty (three or more criteria). (33)

Purser and colleagues, evaluated 309 inpatients aged 70 and older admitted to a cardiology service with minimum 2-vessel coronary artery disease. The assessment of frailty was made by 2 standard frailty phenotypes: Composite A (frailty based upon the definition proposed by Fried) and Composite B (based upon the Frailty Index proposed by Rockwood). Single item performance measures were made (gait speed, grip strength and repeated chair stands). Survival was measured at 6 months. Of the 309 patients 27% had criteria of Composite A (Fried frailty score ≥ 3) and 63% of Composite B (Rockwood frailty score ≥ 1). The highest mortality at 6 months was among those with slow gait speed (14.1%), followed by the composite A (11.9%) and the composite B frailty groups (11.3%). Gait speed remained the strongest independent predictor of 6-month mortality after full adjustment. (34)

Puts et al conceived frailty as a multisystem decline, to be considered as a consequence of changes in neuromuscular, endocrine and immune systems that occur as people age. Nine frailty indicators were used to determine frailty. In the sample of 1720 elderly people (65 and over) they found a prevalence of frailty of 19%. (35)

Specific frailty assessment tools (Table 2)

Fried Criteria

Criteria used to identify frailty depend on the definition used to describe frailty.

Fried and colleagues in the WHAS and the CHS studies identified a physical phenotype of frailty measured by well-validated criteria: unintentional weight loss, self reported exhaustion (based on 2 questions of the CES-D Depression Scale), weakness measured by grip strength, low walking speed and low physical activity (based on the Minnesota Leisure Time Activity Questionnaire). The presence of three or more criteria identified the frailty physical phenotype and 1 or 2 criteria identified a prefrail or intermediate phenotype at high risk for definite frailty. (16, 17, 18)

The SPPB

The SPPB (gait speed, repeated chair stands, and tandem balance tests), based on the lower extremity performance battery was validated in the Established Population for Epidemiologic Studies of the Elderly (EPESE), a cohort of 1122 patients, aged 70 and over. Guralnik and colleagues conclude that among non-disabled older persons living in the community, objective measures of lower-extremity function were highly predictive of subsequent disability. Measures of physical performance may identify older persons with a preclinical stage of disability who may benefit from interventions to prevent the development of frank disability.[30] Similarly, Rolland and colleagues in the EPIDOS study (7250 community-dwelling women, aged 75 and older), concluded that low SPPB, low grip strength, and slow walking speed remained significantly associated with death during a mean follow-up of 3.8 years. (36)

Frailty Index

The Frailty Index, FI, as proposed by Rockwood, is a multi-domain evaluation for frailty in older people. The FI is based upon 4 levels of progressive impairment: (23)

0) Those who walk without help, perform basic activities of daily living, ADL, (eating, dressing, bathing, and bed transfers), are continent of bowel and bladder, and are not cognitively impaired.
1) Bladder incontinence only.
2) One (two if incontinent) or more of needing assistance with mobility or ADL, cognitive impairment with no dementia (CIND), or has bowel or bladder incontinence
3) Two (three if incontinent) or more of totally dependent for

transfers or one or more ADL, incontinent of bowel and bladder, and diagnosis of dementia.

In a second working group, Rockwood measured frailty with the CHSA Clinical Frailty Scale, a seven-point scale based upon a frailty index of 70 items: (24)

1. Very fit: robust, active, energetic, well motivated and fit. These people commonly exercise regularly and are in the most fit group for their age.
2. Well: without active disease, but less fit than people in category 1.
3. Well, with treated comorbid disease: disease symptoms are well controlled compared with those to category 4.
4. Apparently vulnerable: although not frankly dependent, these people commonly complain of being "slowed up" or have disease symptoms.
5. Mildly frail: with limited dependence on others for IADL.
6. Moderately frail: help is needed with both IADL and BADL.
7. Severely frail: completely dependent on others for the ADL, or terminally ill.

Mitnitski established a frailty index assessment based upon 20 deficits observed in a structured clinical examination. (25) The list of deficits comprises: vision loss, hearing loss, impaired mobility, vascular problem, gait abnormality, impaired vibration sense, difficulty toileting, difficulty cooking, difficulty bathing, difficulty going out, difficulty grooming, skin problems, resting tremor, changes in sleep, difficulty in dressing, urinary complaints, gastro-intestinal problems, diabetes, hypertension, and limb tone abnormality.

Studenski evaluated the Clinical Global Impression of Change in Physical Frailty, CGIC-PF instrument. This instrument includes 6 domains (mobility, balance, strength, endurance, nutrition, and neuromotor performance) and 7 consequences (medical complexity, healthcare utilisation, appearance, self-perceived health, ADL, emotional status and social status). Impression of change is scored on a 7-point scale from markedly worse to markedly improved. (29, 31)

Other frailty-related assessment tools

The evaluation of weight loss was proposed by Chin as a measurement of frailty (6% weight loss or more in 4-5 years) combined with the evaluation of inactivity (lowest tertile of the Voorrips' activity questionnaire on housework, leisure-time activity and sports). (27, 28)

A Frailty Index based upon the CGA, the FI-CGA, was proposed by Jones. The FI-CGA is a stratified evaluation tool to describe 3 levels of frailty. (26) The baseline FI-CGA was calculated as a count of the impairments identified at the baseline CGA (assessment in 10 standard domains: cognitive status, mood and motivation, communication, mobility, balance, bowel function, bladder function, IADL and BADL, nutrition, and social resources).

The Lawton IADL scale was used by Nourhashemi and colleagues as a measurement of risk of frailty by presenting at least one impairment in the scale composed of 8 items: ability to travel, shop for groceries, prepare meals, do housework, launder clothes, use of telephone, take medication and management of money. (32)

Purse, evaluated frailty following Fried and Rockwood's diagnostic criteria, but added single item performances (gait speed, grip strength and repeated chair stands). All 3 performance variables had predictive accuracy for identifying frailty. Gait speed appeared to be the best indicator of multidimensional frailty. Patients who walked slower than 0.65 m/s were more than 20 times as likely to be frail as those who walked faster. Patients with grip strength less than 25 kg were 6 times as likely to be frail, and those who rose from a seated position fewer than 7 times in 30 seconds were 14 times as likely to be frail. Even more, these single item performances predicted mortality at 6 month, being gait speed the best predictor. (26)

Syddall and colleagues, performing a survey in 717 elderly persons, and after Bautmans and colleagues, concluded that grip strength, a useful single marker of frailty, was a powerful predictor of self-perceived fatigue, disability, morbidity and mortality. (37,38)

Gill evaluated frailty on a physical-based phenotype (gait speed and chair stand). Persons meeting 1 criterion are moderately frail; those meeting the 2 criteria were severely frail. (22)

Puts assessed frailty on a 9-Frailty Indicator (FI) index: low BMI, low peak expiratory flow, low cognitive functioning, poor distant vision and hearing problems, incontinence, low sense of mastery, depressive symptoms and physical activity. Frailty was defined as the presence of 3 or more indicators. (35)

The Mini-Nutritional Assessment (MNA) has been largely used in clinical practice mostly to assess nutritional status. A MNA less than 17 has been validated as a measurement of protein-caloric malnutrition. When the score is > 23.5 subjects are in good health and well nourished. Scores between 17 and 23.5 identifies patients at risk of malnutrition. This score between 17 and 23.5 appeared to be a marker of frailty and was well correlated with weight loss, poor appetite, functional and cognitive decline and adverse outcomes. (39)

The One-leg test proposed by Vellas and colleagues was evaluated in 686 community-dwelling patients suffering from different degrees of dementia. Vellas found that an abnormal one-leg balance test predicted disability, institutionalisation, mortality and cognitive decline, concluding that this simple assessment tool could be adopted to screen frail Alzheimer subjects. (40)

Discussion

The GAP noted that we might not be ready for a consensual definition or assessment tool for frailty at this time. Possibly, each component of the frailty syndrome has to be seen as a marker of vulnerability. In this line, Bergman and colleagues

looked at 7 markers of vulnerability: the "Fried-5" as well as cognition and mood. They stated that the importance is not to have 2 or 3 criteria but rather the presence of any one of them, as each in of itself is an important marker of adverse outcomes. Possibly, only 1 or 2 markers may in fact be sufficient. (15, 41)

Gait speed was considered by some of the GAP members as a valid single tool to assess frailty in clinical practice. Physical performance measures have shown to be predictive measures for onset of disability and gait speed alone or in combination (like the SPPB) is a strong predictor for adverse outcomes like mortality, hospitalisation or disability. Gait speed could represent the most suitable assessment tool to be implemented in standard clinical evaluation of older people, as assessment of gait speed at usual pace is a quick, inexpensive and highly reliable measure of frailty (42).

Several cutpoints for gait speed as predictors of adverse outcomes have been proposed. Cesari and colleagues, found that patients with a walking speed of less than 1 m/s presented a significantly higher risk for death and hospitalisation within 1 year (43). Guralnik and colleagues, using the SPPB, established a meaningful cutpoint of 0.6 m/s for gait speed to predict adverse outcomes in different settings (42). The cutpoint of 0.6 m/s is very interesting as it predicts the capacity to perform a 400-meter test. Rolland and colleagues compared the 4-meter test with the 400-meter test with the aims of test-retest reliability and to determine whether the 4-meter walking test predicts inability to walk 400 meters. Walking speeds of less than 0.6 m/s predicted the probability (>80%) of not performing the 400-m walking test (44).

Of the definitions and assessment tools proposed, the GAP clearly stated that distinction should be made between adverse outcomes of frailty and frailty itself. As disability is an outcome of frailty it should not be used to evaluate frailty. Although the GAP could not reach consensus on a definition of frailty or a single assessment tool, agreement to consider frailty as a pre-disability stage was settled. This means that the frailty syndrome does not include functional impairment. As disability is not the cause but rather is a consequence of frailty, it should not be included in the definition nor should it be used as a tool for the assessment.

The GAP discussed assessment of frailty in clinical settings, establishing a 2-stepwise assessment:

Screening the population at risk

No screening tools are currently available. Moreover, the question if a screening tool should be administered by a general practitioner or be available as an auto-questionnaire is yet to be resolved. No matter which form to be used, it should be available for:

a) Elderly persons more than 80 years old with subjective fatigue.

b) Those younger but with some risk factor like living alone, memory complaints, history of falls, weigh loss, low walking speed, sensory dysfunction…

As research and consensus develops, a tool for case finding would prove useful. In this sense, the GAP explored the components that should be included in a case finding tool as a first step to detect a possible frailty syndrome. The tool should comprise the following 5 domains: Fatigue, Resistance (defined as the ability to climb stairs), Ambulation (ability to walk certain number of meters), number of Illnesses and Loss of weight (>5%), named FRAIL scale. Its validity will need to be confirmed in determining its predictability of subsequent adverse outcomes in older populations.

Comprehensive Frailty Assessment:

The second step is to perform, as soon as possible, a detailed comprehensive assessment for all individuals at risk, with a positive screening, to be able to diagnose frailty and implement specific primary or secondary interventional strategies in order to prevent the frailty-associated adverse outcomes.

Conclusion

Although the main aim of settling a consensus definition and assessment tool could not be reached, the GAP agreed on defining frailty as a pre-disability state. Excluding physical impairment from definitions and assessment tools is an important step in the conceptualisation of frailty. The exclusion of disability from the frailty syndrome renders many assessment tools and definitions out of date. Even though consensus on the frailty syndrome might nowadays not be possible, many future steps like the present one are needed to definitively untangle the complex physiopathological pathways leading to frailty.

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