Frailty in clinical practice: an evidence based approach

Susan Kurrle

Geriatrician, Hornsby Ku-ring-gai and Eurobodalla Health Services Network Director, NSLHD Aged Care and Rehabilitation Network
Curran Professor in Health Care of Older People
Faculty of Medicine and Health, University of Sydney
What is frailty?
Definition of Frailty 1:  
Physical phenotype: ‘physical frailty’

Operationally defined as:

“A clinical syndrome in which three or more of the following are present:

- unintentional weight loss (>4.5kgs in last year)
- self-reported exhaustion
- weakness (grip strength)
- slow walking speed
- low physical activity”

Fried 2001; Walston 2019
# FRAIL Scale

<table>
<thead>
<tr>
<th>Question</th>
<th>Scoring</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F</strong> Fatigue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much of the time during the past 4 weeks did you feel tired?</td>
<td>A = 1</td>
<td>B = 0</td>
</tr>
<tr>
<td>A = All or most of the time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = Some, a little or none of the time</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>R</strong> Resistance</td>
<td>Yes = 1</td>
<td>No = 0</td>
</tr>
<tr>
<td>In the last 4 weeks by yourself and not using aids, do you have any difficulty walking up 10 steps without resting?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A</strong> Ambulation</td>
<td>Yes = 1</td>
<td>No = 0</td>
</tr>
<tr>
<td>In the last 4 weeks by yourself and not using aids, do you have any difficulty walking 300 meters?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I</strong> Illness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did your Doctor ever tell you that you have?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Cancer (not a minor skin cancer)</td>
<td>0 – 4 answers ✓ = 0</td>
<td></td>
</tr>
<tr>
<td>□ Chronic lung disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Heart Attack</td>
<td>5 – 11 answers ✓ = 1</td>
<td></td>
</tr>
<tr>
<td>□ Congestive heart failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Angina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Asthma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Arthritis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Kidney disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>L</strong> Loss of weight</td>
<td>Yes = 1</td>
<td>No = 0</td>
</tr>
<tr>
<td>Have you lost more than 5kg or 5% of your body weight in the past year?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Score**

Scoring: Robust = 0, Pre-frail = 1-2, Frail = >3
Definition of Frailty 2: Accumulated deficits model: ‘deficit accumulation frailty’

- Biological process
- “Accumulated deficits”
- Gender specific
- Clearly related to mortality
- Expressed as an “index” (> 0.2 likely to be pre-frail, > 0.25 likely to be frail)

Mitnitski & Rockwood 2002
Frailty Index

Appendix 1: List of variables used by the Canadian Study of Health and Aging to construct the 70-item CSHA Frailty Index

- Changes in everyday activities
- Head and neck problems
- Poor muscle tone in neck
- Bradykinesia, facial
- Problems getting dressed
- Problems with bathing
- Problems carrying out personal grooming
- Urinary incontinence
- Toileting problems
- Bulk difficulties
- Racial problems
- Cerebrovascular problems
- Problems cooking
- Sucking problems
- Problems going out alone
- Impaired mobility
- Musculoskeletal problems
- Bradykinesia of the limbs
- Poor muscle tone in limbs
- Poor limb coordination
- Poor coordination, trunk
- Poor standing posture
- Irregular gait pattern
- Falls
- Mood problems
- Feeling sad, blue, depressed
- History of depressed mood
- Tiredness all the time
- Depression (clinical impression)
- Sleep changes
- Restlessness
- Memory changes
- Short-term memory impairment
- Long-term memory impairment
- Changes in general mental functioning
- Onset of cognitive symptoms
- Clouding or delirium
- Paranoid features
- History relevant to cognitive impairment or loss
- Family history relevant to cognitive impairment or loss
- Impaired vibration
- Tremor at rest
- Postural tremor
- Intention tremor
- History of Parkinson's disease
- Family history of degenerative disease
- Seizures, partial complex
- Seizures, generalized
- Syncope or blackouts
- Headache
- Cerebrovascular problems
- History of stroke
- History of diabetes mellitus
- Arterial hypertension
- Peripheral pulses
- Cardiac problems
- Myocardial infarction
- Arrhythmia
- Congestive heart failure
- Lung problems
- Respiratory problems
- History of thyroid disease
- Thyroid problems
- Skin problems
- Malignant disease
- Breast problems
- Abdominal problems
- Presence of snout reflex
- Presence of the palpatmore reflex
- Other medical history
**Clinical Frailty Scale**

1. **Very Fit** – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2. **Well** – People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally, e.g. seasonally.

3. **Managing Well** – People whose medical problems are well controlled, but are not regularly active beyond routine walking.

4. **Vulnerable** – While not dependent on others for daily help, often symptoms limit activities. A common complaint is being “slowed up”, and/or being tired during the day.

5. **Mildly Frail** – These people often have more evident slowing, and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6. **Moderately Frail** – People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.

7. **Severely Frail** – Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8. **Very Severely Frail** – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. **Terminally Ill** – Approaching the end of life. This category applies to people with a life expectancy <6 months, who are not otherwise evidently frail.

**Scoring frailty in people with dementia**

The degree of frailty corresponds to the degree of dementia. Common symptoms in mild dementia include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

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Definition of frailty 3: Multidimensional model of frailty

- Frailty is a dynamic state affecting an individual who experiences losses in one or more domains of human functioning (physical, psychological, social), which is caused by the influence of a range of variables and which increases the risk of adverse outcomes.
# The Edmonton Frail Scale

**NAME:**

d.o.b. : __________________  DATE : __________________

<table>
<thead>
<tr>
<th>Frailty domain</th>
<th>Item</th>
<th>0 point</th>
<th>1 point</th>
<th>2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognition</td>
<td>Please imagine that this pre-drawn circle is a clock. I would like you to place the numbers in the correct positions then place the hands to indicate a time of &quot;ten after eleven&quot;</td>
<td>No errors</td>
<td>Minor spacing errors</td>
<td>Other errors</td>
</tr>
<tr>
<td>General health status</td>
<td>In the past year, how many times have you been admitted to a hospital?</td>
<td>0</td>
<td>1–2</td>
<td>≥2</td>
</tr>
<tr>
<td></td>
<td>In general, how would you describe your health?</td>
<td>Excellent; 'Very good', 'Good'</td>
<td>'Fair'</td>
<td>'Poor'</td>
</tr>
<tr>
<td>Functional independence</td>
<td>With how many of the following activities do you require help? (meal preparation, shopping, transportation, telephone, housekeeping, laundry, managing money, taking medications)</td>
<td>0–1</td>
<td>2–4</td>
<td>5–8</td>
</tr>
<tr>
<td>Social support</td>
<td>When you need help, can you count on someone who is willing and able to meet your needs?</td>
<td>Always</td>
<td>Sometimes</td>
<td>Never</td>
</tr>
<tr>
<td>Medication use</td>
<td>Do you use five or more different prescription medications on a regular basis?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>At times, do you forget to take your prescription medications?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td>Have you recently lost weight such that your clothing has become looser?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Mood</td>
<td>Do you often feel sad or depressed?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Continence</td>
<td>Do you have a problem with losing control of urine when you don't want to?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Functional performance</td>
<td>I would like you to sit in this chair with your back and arms resting. Then, when I say &quot;GO&quot;, please stand up and walk at a safe and comfortable pace to the mark on the floor (approximately 3 m away), return to the chair and sit down</td>
<td>0–10 s</td>
<td>11–20 s</td>
<td>One of: &gt;20 s, or patient unwilling, or requires assistance</td>
</tr>
</tbody>
</table>

**Scoring:**

0 - 5 = Not Frail  
6 - 7 = Vulnerable  
8 - 9 = Mild Frailty  
10-11 = Moderate Frailty  
12-17 = Severe Frailty

**TOTAL**  [17]

Administered by: __________________
# Commonly used frailty instruments

<table>
<thead>
<tr>
<th>Components</th>
<th>Frailty classification</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frailty phenotype&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Five items: weight loss, low physical activity, exhaustion, slowness, weakness</td>
<td>Frailty: ≥ 3 items; pre-frailty: 1-2 items; robust: 0 items</td>
</tr>
<tr>
<td>Frailty Index&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>30 or more accumulated health deficits: scores range from 0 (no deficits) to 1 (all deficits)</td>
<td>Continuous score; suggested cutoff score for frailty &gt;0.25&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Electronic Frailty Index&lt;sup&gt;15&lt;/sup&gt;</td>
<td>As for the Frailty Index, with variables derived from routine electronic health records in primary care; also considered to be a case-finding instrument</td>
<td>Severe frailty: score &gt;0.36; frailty: score &gt;0.24-0.36; mild frailty: score &gt;0.12-0.24; fit: score ≥0.12</td>
</tr>
<tr>
<td>Clinical Frailty Scale&lt;sup&gt;16&lt;/sup&gt;</td>
<td>Visual and written chart for frailty with nine graded pictures: 1=very fit; 9=terminally ill</td>
<td>Frailty: score ≥5</td>
</tr>
<tr>
<td>FRAIL scale&lt;sup&gt;11&lt;/sup&gt;</td>
<td>Five items: fatigue, resistance, ambulation, illness, loss of weight</td>
<td>Frailty: ≥ 3 items; pre-frailty: 1-2 items; robust: 0 items</td>
</tr>
<tr>
<td>Study of Osteoporotic Fractures frailty criteria&lt;sup&gt;27&lt;/sup&gt;</td>
<td>Three items: weight loss, exhaustion, unable to rise from a chair five times</td>
<td>Frailty: ≥ 2 items; pre-frailty: 1 items; robust: 0 items</td>
</tr>
<tr>
<td>PRISMA-7&lt;sup&gt;28&lt;/sup&gt;</td>
<td>Seven self-reported items: age (&gt;85 years), male, social support, and ADLs</td>
<td>Frailty: score ≥3</td>
</tr>
<tr>
<td>Tilburg Frailty Indicator&lt;sup&gt;29&lt;/sup&gt;</td>
<td>15 self-reported items in three domains: physical, psychological, and social</td>
<td>Frailty: score ≥5</td>
</tr>
<tr>
<td>Geriatric 8 frailty questionnaire for oncology (G8)&lt;sup&gt;30&lt;/sup&gt;</td>
<td>Eight items: function (ADL and IADL), mobility, nutrition, comorbidity, cognition, depression, social support</td>
<td>Frailty: score ≤14</td>
</tr>
<tr>
<td>Groningen Frailty Indicator&lt;sup&gt;31&lt;/sup&gt;</td>
<td>15 self-reported items in four domains: physical, cognitive, social, psychological</td>
<td>Frailty: score ≥4</td>
</tr>
<tr>
<td>Short Physical Performance Battery&lt;sup&gt;32&lt;/sup&gt;</td>
<td>Three measured items: gait speed, standing balance, and repeated chair stands; each item scored from 0-4, maximum score of 12</td>
<td>Frailty: score ≥9</td>
</tr>
<tr>
<td>Edmonton Frailty Scale&lt;sup&gt;33&lt;/sup&gt;</td>
<td>Nine items: cognition, health (2 x), hospitalisation, social support, nutrition, mood, function, continence</td>
<td>Frailty: score ≥7</td>
</tr>
<tr>
<td>Multidimensional Prognostic Index&lt;sup&gt;34&lt;/sup&gt;</td>
<td>Eight items: comorbidity, nutrition, cognition, polypharmacy, pressure sore risk, living status, ADL, IADL</td>
<td>Frailty: score &gt;0.66; pre-frailty: score 0.34-0.66; robust: score &lt;0.34</td>
</tr>
<tr>
<td>Kihon Checklist&lt;sup&gt;35&lt;/sup&gt;</td>
<td>25 dichotomous items in seven categories: physical strength, nutrition, eating, socialisation, memory, mood, and lifestyle; scoring as per the Frailty Index</td>
<td>Continuous score; suggested frailty cutoff score ≥ 0.25</td>
</tr>
<tr>
<td>Frailty Risk Score&lt;sup&gt;36&lt;/sup&gt;</td>
<td>Formula: age (per 10 years) + 4 + male sex × 10 + no partner × 5 + body mass index &lt;18.5 kg/m&lt;sup&gt;2&lt;/sup&gt; × 12 + cardiovascular disease × 4 + diabetes × 4 + number of drugs ≥2 × 5, EMS&lt;20 × 5 + ADL motor deficit × 4 + ADL process deficit × 7. Also considered to be a case finding instrument.</td>
<td>Very good: score &lt;45; good: score 45-50; moderate: score 51-55; poor: score 56-61; very poor: score &gt;61</td>
</tr>
<tr>
<td>Hospital Frailty Risk Score&lt;sup&gt;37&lt;/sup&gt;</td>
<td>109 summed items from ICD-10 frailty-relevant codes from administrative hospital data. Also considered to be a case finding instrument.</td>
<td>Low risk: score ≥5; intermediate risk: score 5-15; high risk: score &gt;15</td>
</tr>
</tbody>
</table>

<sup>a</sup>EMS=Elderly Mobility Scale. ADL=activities of daily living. IADL=instrumental activities of daily living. ICD-10=International Statistical Classification of Diseases and Related Health Problems, 10th revision. Derived and modified from Dent and colleagues, 2016. <sup>13</sup>

**Table 1: Commonly used frailty instruments**
Is this person frail?

**Edmonton Frail Scale:** 10/17 Mod frail

**FRAIL Scale:** 3/5 Frail

**Clin Frailty Scale:** 6/9 Mod frail
Is this person frail?

- Edmonton Frail Scale: 4/17 Not frail
- FRAIL Scale: 4/5 Frail
- Clin Frailty Scale: 6/9 Mod frail
Is this person frail?

- Edmonton Frail Scale: 10/17 Mod frail
- FRAIL Scale: 0/5 Robust
- Clin Frailty Scale: 4/9 Vulnerable
Frailty is **not** disability, but most people with disabilities whom health professionals see, are frail.

Percentages are for frail people:

- Disability: 6%
- Comorbidity: 46%
- Frailty: 27%
- Frailty is not disability: 21%

NB: This is the Cardiovascular Health Study – an epidemiological study

Fried et al. J Geront 2001;56:M146-M156
Risk factors for onset or progression of frailty

- Demographic and social factors
  - Advanced age
  - Female sex
  - Ethnic minority
  - Low education
  - Low socioeconomic position
  - Living alone
  - Loneliness

- Clinical factors
  - Multimorbidity and chronic diseases
  - Obesity
  - Malnutrition
  - Impaired cognition
  - Depressive symptoms
  - Polypharmacy

- Lifestyle factors
  - Physical inactivity
  - Low protein intake
  - Smoking
  - Increased alcohol intake

- Biological factors
  - Inflammation (elevated cytokines or CRP)
  - Endocrine factors (androgen deficiency or IGF-1)
  - Micronutrient deficits (low carotenoids, vitamin B6, vitamin D, or vitamin E)
Consequences of frailty

- Approx 21% people over age 65 are frail, 48% are pre-frail
- Frailty is associated with:
  - increased likelihood of hospitalisation
  - Increased risk of post op complications after general surgery, vascular surgery, neurosurgery, trauma surgery
  - Increased risk of urinary tract infection, pneumonia, DVT
  - longer length of hospital stay
  - increased risk of functional decline
  - increased risk of institutionalisation
  - increased risk of falls and fractures
  - increased likelihood of developing Alzheimer’s disease
  - increased risk of death

Khan 2017; Ravindrarajah 2017; Wallace 2019
Frailty predicts mortality in all emergency surgical admissions regardless of age. An observational study

- Multicentre prospective cohort study of 2279 emergency surgical patients in UK
- Frailty predicted poorer patient outcomes and mortality irrespective of age
Frailty and Cancer

The Prognostic Importance of Frailty in Cancer Survivors

Justin C. Brown, MA,* Michael O. Harhay, MPH,* and Meera N. Harhay, MD, MSCE†

- NHANES
- Assessed using Fried Frailty criteria
- N = 416 with cancer
- 9.1% frail, 37.3% pre-frail
- Survival over 11 + years:
  - non frail 13.9 yrs
  - pre frail 9.5 years
  - frail 2.5 years

JAGS 2015; 63: 2538
So what can we do about frailty?
Treatment of frailty

- Frailty is a dynamic state with individuals transitioning between frail, pre-frail and non-frail states, and both prevention and treatment are feasible.

- There are generally considered to be several evidence-based areas of intervention for older people with frailty:
  - Physical activity programs (resistance training, aerobic training, balance or coordination training)
  - Nutritional interventions (protein or protein-energy supplementation)
  - Multicomponent interventions
  - Individualised geriatric care (comprehensive geriatric assessment) targeting clinical conditions
Frailty Intervention Trial (FIT): Sydney 2011

- RCT of 241 community dwelling people aged 70yrs and over, assessed as physically frail using Fried Frailty criteria (3 or more criteria)
- Randomised to intervention (mainly exercise and nutritional advice) or control (normal care)
- Blinded follow-up at 3 and 12 months looking at physical frailty and physical performance (SPPB)
FIT Program Results

Short Physical Performance Battery (mean score)
Scored out of 12, higher is better

- Intervention
- Control

Baseline  3 months  12 months
Case  Mrs T: start of intervention

Fried criteria - “frail” – Walking speed, Exhaustion, Grip, Energy expenditure
Case Mrs T: end of intervention

No longer “frail” – only grip strength
Implementing evidence based guidelines for management of frailty
Interventions to prevent or reduce the level of frailty in community-dwelling older adults: a scoping review of the literature and international policies

- Likely effective: physical activity interventions (all types and combinations), and prehabilitation
- Mixed effectiveness: comprehensive geriatric assessment (CGA).
- Issues: differing definitions of frailty
- Recommendations: “Future research could combine interventions targeting more frailty markers including cognitive or psychosocial well-being”.

Frailty Clinical Practice Guidelines

The Asia-Pacific Clinical Practice Guidelines for the Management of Frailty

Recommendations:

• **Strong:**
  - Use a validated measurement tool to **identify frailty**
  - Prescribe **physical activity** with a resistance training component
  - Address **polypharmacy**

• **Conditional**
  - Screen for, and address, **fatigue**
  - Address **weight loss** with **protein/calorie** supplementation if appropriate
  - Prescribe **Vit D** if Vit D deficient
Practical application of frailty guidelines in acute hospital older patients: Northern Sydney Frailty Initiative

• Use of FRAIL Scale (based on pre-admission status) to screen older patients presenting to ED, or on admission to ward

• Need informant to complete if delirium, dementia, LOC etc

• Score of 3/5 or higher indicates likelihood of frailty

• 06/02/2020: 816 patients screened with 447 having scores of 3 or more on FRAIL Scale (55%), 36% pre-frail, 9% robust
Northern Sydney Frailty Initiative

• FRAIL Scale responses indicate appropriate interventions ie physiotherapy, dietitian, pharmacist, geriatrician review
• On discharge Frailty Intervention form generated from eMR and sent to general practitioner along with discharge summary
• GPs to follow patient up in the community and continue or implement the appropriate intervention/s
• GPs use Frailty HealthPathway to assist in designing interventions and have list of low cost exercise interventions in the community, and reminders about Home Medicines Review.
A different approach to implementing a frailty intervention

- A pre-post interventional study of frail and pre-frail older people living in a retirement village in independent living or supported accommodation
- \( N = 11 \), mean age 87.3 years (range 78-95)
- Primary outcome: walking speed, HGS, tandem stance
- Intervention over 7 weeks: interaction with 10 4-year olds
- Clinically and statistically significant improvement in all primary outcome measures