Part 2: Brief screening tests for frailty

**FRAIL questionnaire**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Scoring Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>“How often of the time during the past 4 weeks did you feel tired?”</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>If all of the time or most of the time, give 1 point.</td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td>“Do yourself and not using aids, do you have any difficulty walking up 10 stairs without resting?”</td>
<td>1</td>
</tr>
<tr>
<td>Ambulation</td>
<td>“Do yourself and not using aids, do you have any difficulty several hundred yards?”</td>
<td>1</td>
</tr>
<tr>
<td>Press</td>
<td>“Did a doctor ever tell you that you have (illness)?”</td>
<td>1</td>
</tr>
<tr>
<td>Loss of weight</td>
<td>More than 5% weight loss over 1 year</td>
<td>1</td>
</tr>
</tbody>
</table>

**Clinical Frailty Scale**

- **Frailty Index:** Easy to understand, and easy to use and may readily be administered in a clinical setting, an advantage over the tools previously developed. For example, counting deficits with the Frailty Index is easy to understand, and is more prognostic than maximum gait speed.
- **Time to complete 5 chair stands without use of arm:** More than 9 sec for women, 6 sec for men.
- **Usual gait speed:** More prognostic than maximum gait speed.
- **A stopwatch and a long corridor are needed:** To consider the task as abnormal.
- **A chair and small space are needed:** To consider the task as abnormal.
- **A sensor/wearable device is available:** To consider the task as abnormal.
- **Probability of survival:** Probability of survival is low for individuals in the severely frail group.
- **Probability of avoidance of institutional care:** Probability of avoidance is high for individuals in the severely frail group.

**Brief frailty screening tools (<3 mins)**

<table>
<thead>
<tr>
<th>FRAIL scale</th>
<th>Clinical Frailty Scale</th>
<th>Gait speed</th>
<th>Chair stands</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 characteristics are assessed (self-report)</td>
<td>A general assessment of medical history, ADL, and IADL disability is needed.</td>
<td>4-meter or 5-meter usual gait speed</td>
<td>Time to complete 5 chair stands without use of arm</td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td>!</td>
<td>!</td>
</tr>
<tr>
<td>Resistance</td>
<td></td>
<td>!</td>
<td>!</td>
</tr>
<tr>
<td>Ambulation</td>
<td></td>
<td>!</td>
<td>!</td>
</tr>
<tr>
<td>Illness</td>
<td></td>
<td>!</td>
<td>!</td>
</tr>
<tr>
<td>Loss of weight</td>
<td></td>
<td>!</td>
<td>!</td>
</tr>
</tbody>
</table>

**Rockwood et al. JAMA. 2005; 173: 469-485.**


**Studenski et al. JAMA. 2001; 205:50-9.**

**Bandari et al. J Am Geriatr Soc. 2006; 54: 2072-2073.**

Usual gait speed

- Time to complete a 4-meter or 5-meter walk
- 0.1 m/s difference ~ 12% relative change in mortality
- Gait speed <0.8 m/s: sensitivity 99%, specificity 64% for frailty phenotype
- Gait speed depends on sensory organs, brain and nervous system, cardiopulmonary function, and musculoskeletal system

Gait speed assessment in BIDMC Gerontology

- Measurement of gait speed using a LIDAR sensor

Chair rise test

- Time to complete 5 chair rises without using arms
- A test of lower extremity muscle strength

Part 3: Comprehensive geriatric assessment for frailty evaluation and management
**Comprehensive geriatric assessment (CGA)**

- Assessment of multiple domains:
  - Medical history and medications
  - Functional status and disability
  - Cognition and mood
  - Physical performance
  - Nutritional status
  - Social support
- Performed by a geriatrician or multidisciplinary team
- Reduce mortality, functional decline, and institutionalization

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**BIDMC FI calculator**

- A 50-item deficit-accumulation FI
  - Range: 0 to 1
  - Submaximal limit: ~0.7
- Based on CGA items
  - Medical history and polypharmacy (21 items)*
  - Functional status (22 items)*
  - Cognitive and physical performance (4 items)
  - Nutritional status (3 items)
  - (*) Mandatory

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**Interpretation of FI**

- Severity of frailty
  - Score Classification
    - Score 0.15: Non-frail
    - Score 0.24: Pre-frail
    - Score 0.34: Mild frail
    - Score 0.44: Moderate frail
    - Score 0.54: Severe frail
    - Score 0.55: Advanced frail

- FI as a biologic age?
  - Example: a 75-yr woman with FI 0.33 (similar to the mean FI of 85-89 year-olds)

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**Prognostication (risk prediction) based on FI**

- 1-Year Risk of Health Outcome
  - Non-frail (<0.15)
  - Pre-frail (0.15-0.24)
  - Mildly frail (0.25-0.34)
  - Moderately frail (0.35-0.44)
  - Severely frail (≥0.45)

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**BIDMC FI calculator**

https://www.bidmc.org/research/research-department/med fetal gerontology/calculator

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Data from National Health and Aging Trends Study (community-dwelling Medicare population)
Multi-component interventions for frailty

<table>
<thead>
<tr>
<th>Domain</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>- Prioritize management of conditions that have a major impact on functioning</td>
</tr>
<tr>
<td></td>
<td>- Relax disease management targets (e.g., diabetes, hypertension)</td>
</tr>
<tr>
<td></td>
<td>- Deprescribe medications that have high likelihood of harms and unclear benefits</td>
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<tr>
<td></td>
<td>(i.e., time-to-benefit &gt; life expectancy)</td>
</tr>
<tr>
<td>Physical function</td>
<td>- Physical therapy or exercise program</td>
</tr>
<tr>
<td></td>
<td>- Home hazard modification and vitamin D supplementation for fall prevention</td>
</tr>
<tr>
<td>Disability</td>
<td>- Provide services to assist medication management and housework</td>
</tr>
<tr>
<td></td>
<td>- Social worker referral</td>
</tr>
<tr>
<td>Cognitive function</td>
<td>- Cognitive training</td>
</tr>
<tr>
<td></td>
<td>- Deprescribe psychoactive drugs; consider medications for memory</td>
</tr>
<tr>
<td>Nutrition</td>
<td>- Nutritional supplementation</td>
</tr>
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</table>

Examples of frailty intervention programs

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<table>
<thead>
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<tr>
<td>Cameron (JAMC Med 2013; 11: 66)</td>
<td>216 community-dwelling patients with frailty (mean age 83 y)</td>
</tr>
<tr>
<td>Jang (CIt-Int Aging 2013; 13: 1799-1814)</td>
<td>187 community-dwelling adults with frailty (mean age 77 y)</td>
</tr>
</tbody>
</table>

Fl for shared decision-making before surgery

- A prospective cohort study (n=246; mean age 82 y) of TAVR and SAVR
- Functional status: number of physical tasks one can perform without help (0-22)

Prehabilitation and geri-surgery co-management

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<td>Barberan-Garcia (Ann Surg 2013; 267: 60-66)</td>
<td>125 elective abdominal surgery patients (mean age 71 y; 75% cancer)</td>
</tr>
</tbody>
</table>


- Personalized program for daily activity (pedometer) + stationary bike, 1-3/wk for 6 wk vs. usual care
- Integrated care (geriatrics, surgery, anesthesia, preop-CGA and plan, geri-surgery co-mgmt vs. usual care

McDonald (JAMA Surg 2015; 168: 464-462)

- Median length of stay
- Mortality at 7 and 30 d

Part 4: Frailty and Post-Acute Care

No standardized frailty assessment in PAC

Deficit-accumulation Fl in PAC

Hospitalization-associated disability

A pilot study in an inpatient geriatric rehabilitation unit in Australia

- 258 patients (mean age 79 yrs, female 54%)
- Routinely collected data:
  - Functional Independence Measure (18 items)
  - Comorbidities (14 items)
  - Polypharmacy
- Mean Fl: 0.42 (SD, 0.13); 99% percentile: 0.69
- OR of higher level of care or death per 0.1 increase in Fl: 1.38 (95% CI, 1.11-1.70)