Multicenter Study for Frailty Assessment in Vascular Surgery Patients

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Frailty

• A medical syndrome
  – with multiple causes and contributors
  – characterized by diminished strength, endurance, and reduced physiologic function
  – increases an individual’s vulnerability for developing increased dependency and/or death
  – Domains: physical, functional, cognitive, nutritional, social

J.E. Morley et al. / JAMDA 14 (2013) 392e397
Key differences

• Aging
  – Not all older adults become frail, and, even in the very advanced age, that percentage remains under 50%

• Disability
  – Frail individuals could be disabled but not all disabled persons are frail

• Sarcopenia
  – may be a component of frailty, however frailty is more multifaceted than sarcopenia

• Multimorbidity.
  – Multimorbidity is more pervasive, present in 3 of 4 persons $\geq$ 65 years and 1 of 4 in those <65.
Frailty as a Predictor of Surgical Outcomes in Older Patients

Martin A Makary, MD, MPH, FACS, Dorry L Segev, MD, PhD, FACS, Peter J Pronovost, MD, PhD, Dora Syin, MD, Karen Bandeen-Roche, PhD, Purvi Patel, MD, MPH, Ryan Takenaga, MD, Lara Devgan, MD, MPH, Christine G Holzmueller, BLA, Jing Tian, MS, Linda P Fried, MD, MPH

• Prospective cohort study of 594 patients ≥65 years old and undergoing elective surgery

• Frail patients were at an
  – increased risk of postoperative complications,
  – increased length of stay, and
  – discharge to a skilled facility after being admitted from home.

• Frailty further increased the power of traditional risk indices like ASA class, Eagle and Lee risk indices
Frailty increases the risk of 30-day mortality, morbidity, and failure to rescue after elective abdominal aortic aneurysm repair independent of age and comorbidities

- 23,207 patients, NSQIP database
- Adjusted mortality odds ratio: OR 1.9 (95% CI, 1.2-3.0) after endovascular and 2.3 (95% CI, 1.4-3.7) after open repair
- Clavien-Dindo class IV complications after EVAR (OR 1.7; 95% CI, 1.3-2.1) and OAR (OR 1.8; 95%, CI, 1.5-2.1).
- There was also a higher FTR rate among frail patients, with OR 1.7 (95% CI, 1.2-2.5)

Shipra Arya, MD, SM, Sung In Kim, BS, Yazan Duwayri, MD, Luke P. Brewster, MD, PhD, Ravi Veeraswamy, MD, Atef Salam, MD, and Thomas F. Dodson, MD, Atlanta and Decatur, Ga

Arya et al JVS 2014
- **Risk Analysis Index (RAI)** - 11/12 items from MMRI-R
- Intended for pre-operative Frailty Calculator
- Completed in less than a minute
- Validated and predictive of post-operative morbidity and mortality
Figure 2a: RAI-C

Proportion Surviving

RAI-C Score
- ≤15
- 16-25
- 26-35
- ≥36
- ≤15-censored
- 16-25-censored
- 26-35-censored
- ≥36-censored

Length of Survival (Days)
• Despite the wide variety of tools/definitions used to measure frailty......

• Frailty is predictive of mortality, postoperative complications, length of stay, institutional discharge and readmissions in patients undergoing surgery.
<table>
<thead>
<tr>
<th>Frailty category (n = 10)</th>
<th>VQI variable (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>Congestive heart failure</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>History of coronary artery disease (angina, MI)</td>
</tr>
<tr>
<td></td>
<td>Prior CABG/PCI</td>
</tr>
<tr>
<td></td>
<td>Positive cardiac stress test</td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>Any ankle-brachial index &lt;0.7</td>
</tr>
<tr>
<td></td>
<td>Prior arterial vascular operation&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Renal impairment</td>
<td>Creatinine &gt;1.78 mg/dL</td>
</tr>
<tr>
<td></td>
<td>Dialysis</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td>Lung or respiratory problem</td>
<td>Chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>Functional dependence</td>
<td>Preadmission living (home/nursing home)</td>
</tr>
<tr>
<td></td>
<td>Preadmission ambulation&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Other medical problem</td>
<td>Anemia&lt;sup&gt;c&lt;/sup&gt; (hemoglobin &lt;13 g/dL, male; &lt;12 g/dL, female)</td>
</tr>
<tr>
<td>Underweight</td>
<td>Body mass index &lt;19 kg/m&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*CABG*, Coronary artery bypass grafting; *MI*, myocardial infarction; *PCI*, percutaneous coronary intervention.

<sup>a</sup>Bypass, carotid endarterectomy, aneurysm repair, peripheral vascular intervention, major amputation.

<sup>b</sup>Ambulatory, ambulatory with assist, wheelchair, bedridden
Frailty4Site

- Implementing Pre-operative Frailty Assessment in the Vascular Surgery Clinic

- Funded by Vascular Cures Foundation
Sites

• University of Utah - Principal Investigator, Larry Kraiss, MD (Lead)
• Dartmouth- Hitchcock - Philip P Goodney, MD, MS
• Emory University, Atlanta, GA – Shipra Arya, MD, SM
• University of Nebraska – Jason Johanning, MD
• Stanford University – Matthew Mell, MD
• Aim: To compare more straightforward phenotype model of frailty (FFI) with three different accumulated deficits instruments of varying complexity (CFS, RAI, VQI-FS)
Fried Frailty Phenotype

**Clinical Phenotype: Cycle of Frailty**

- Weight Loss as indicator of chronic undernutrition
- Sarcopenia
- Resting metabolic rate
- Strength and Power
- Exercise tolerance “Exhaustion”
- Slow Walking Speed
- Low Physical Activity
- Total energy expenditure
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 for being tired during the day.

5. Mildly Frail – These people often have more evident slowing, and need help in higher 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.

Where dementia is present, the degree of frailty usually corresponds to the degree of dementia:

- Mild dementia – includes forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

- 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.

- Severe dementia – they cannot do personal care without help.
<table>
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<tr>
<th>Question</th>
<th>Options</th>
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<tbody>
<tr>
<td>Record ID</td>
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<tr>
<td>Age</td>
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<tr>
<td>Age Group</td>
<td>85-89</td>
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<tr>
<td>Gender</td>
<td>Female</td>
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<tr>
<td>Any intentional weight loss of 10 pounds or more in the past 3 months?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Any history of renal failure, renal insufficiency, or seeing a nephrologist?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Any history of chronic congestive heart failure?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Is the patient’s appetite currently poor?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Does the patient currently have shortness of breath at rest?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Any history of memory loss, functional deficits or cognitive skills in the past 3 months?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Does the patient reside in a setting other than independent living?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Cancer</td>
<td></td>
</tr>
<tr>
<td>Is the procedure being done to diagnose cancer?</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Any disseminated, unresectable mets?</td>
<td>No, Yes</td>
</tr>
</tbody>
</table>
Activities of Daily Living

Independent: No help or oversight - or - help or oversight provided only 1-2 times in the past 7 days.
Supervised: Oversight, supervision or cuing provided 3 or more times during the past 7 days.
Limited assistance: Patient highly involved in activity but received physical help in guided maneuvering of limbs or other none weight bearing assistance 3 or more times in the last 7 days.
Extensive assistance: Patient performed part of activity in the past 7 days but received help for the following: Weight bearing support - or - full staff performance during the past 7 days.
Total dependence: Full staff performance during the past 7 days.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Independent</th>
<th>Supervised</th>
<th>Limited Assistance</th>
<th>Extensive Assistance</th>
<th>Total Dependence</th>
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</thead>
<tbody>
<tr>
<td>Requiring any assistance with mobility?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Requiring any assistance to eat?</td>
<td></td>
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<tr>
<td>Requiring any assistance with the toilet?</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Requiring any assistance with personal hygiene?</td>
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Scoring

<table>
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<th>Score Type</th>
<th>Value</th>
<th>View equation</th>
<th>Disclaimer</th>
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</thead>
<tbody>
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<td>ADL Score</td>
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<tr>
<td>Adjusted ADL Score</td>
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<tr>
<td>Age Score</td>
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<td></td>
</tr>
<tr>
<td>RAI Total</td>
<td>27</td>
<td></td>
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</tbody>
</table>

Form Status

Complete? [Incomplete]

Save Record
Save and Continue

-- Cancel --
Aim 2

• To assess the relationship between pre-operative frailty assessment using different instruments and incidence of composite long-term outcome
  – mortality, loss of functional independence assessed at 9-15 months follow-up visit following vascular surgery procedures in participating institutions.
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