eAppendix A: Frailty Index Construction

 Missing data, value assignment

A neuropsychologist and a geriatrician reviewed all available data for persons with intermittent missing test values. A value was assigned indicating a deficit if a participant was deemed too impaired in that particular domain to complete the test. If no such deduction could be made, a single conditional mean based on a Monte-Carlo Markov Chain imputation process was used to assign a value. Only 0.1% to 1.7% of any given criteria were completed based on imputation. No assignments were made for missed visits, missing APPROACH or bloodwork data.

 Frailty Index (FI) Construction

The following criteria were used to determine which data would be included as deficits in the FI:

1) The deficit is associated with health status.
2) The prevalence of the deficit in the population increases with the age of the population.
3) The deficit does not saturate within a population until very old age, if at all.
4) The deficits overall cover a range of systems.
5) The measurement collected for an entire sample is comprised of the same deficits.

One point was given for any of the following 53 deficits to create the FI score. Partial points were given as indicated below. Measurements were taken at all visits unless otherwise indicated. Physical characteristics (5 deficits) included body mass index, two questions and two tests from the Macarthur Studies of Successful Aging. Health-related quality of life criteria (6 deficits) included a self-rated health question, and five items from the EuroQOL EQ-5D questionnaire. Cognitive criteria (6 deficits) were age, sex, and education-adjusted scores from the animal naming test, “FAS” letter naming test, a global cognition test, a trail-making executive function test, a verbal delayed recall test and a visual-spatial delayed recall test. Mood criteria (4 deficits) include an anxiety scale, the 15-item Geriatric Depression Scale, and two subscales based on the Geriatric Depression Scale. Self-reported activities of daily living (7 deficits) and instrumental activities of daily living (7 deficits) provided functional
SUPPLEMENTAL MATERIAL

criteria. Baseline diseases (12 deficits) and medical conditions (5 deficits) such as ejection fraction were provided by APPROACH. Of these, diabetes, acute coronary syndrome, and hypertension were updated during caregiver interviews. Self-reported strokes and TIAs were collected using a validated stroke questionnaire. Collected blood samples provided homocysteine and B12 levels. Living arrangements (1 deficit) were self-reported.

For the 53 criteria, data was complete for 87.2-87.8% of the study population across all visits. For between 11.0% and 11.7% of the sample, across all visits, 51 or 52 criteria were present. The denominator was between 40 and 50, due to missing data, for approximately 1% of the study sample across all visits.

Physical Characteristics and Performance

1. Abnormal body mass index (< 21 or >30 kg/m²) based on self-reported height and weight
2. Unable or didn’t know if able to walk up stairs without help (self-reported)
3. Unable or didn’t know if able to walk half a mile without help (self-reported)
4. Balance test: unable to hold full tandem for >10 sec
5. Gait test: unable to walk 8 feet in <4 sec

Health-Related Quality of Life

6. Response of “fair” or “poor” to question, “In general, would you say your health is excellent, very good, good, fair, or poor?”
7. Some problems with washing/dressing (0.5); unable to wash/dress (1.0)
8. Some problems performing usual activities (work, study, housework, leisure) (0.5); unable (1.0)
9. Has moderate pain/discomfort (0.5); has extreme pain/discomfort (1.0)
10. Is moderately anxious or depressed (0.5); is extremely anxious or depressed. (1.0)
11. Self-rated health on scale of 0 to 100 (thermometer) less than or equal to 65.
SUPPLEMENTAL MATERIAL

Cognition

12. Animal Naming Test: 1.5 standard deviations below age and education adjusted norms
13. FAS Test: 1.5 standard deviations below age and education adjusted norms
14. MMSE: in the bottom 10 percentile of age, sex, education-adjusted norms
15. Trails B: Test 1.5 standard deviations below age, sex, and education adjusted norms
16. CERAD Verbal Memory Delayed Recall: 1.5 standard deviations below age, sex, and education adjusted norms
17. Brief Visuospatial Memory-Revised Delayed Recall Test: 1.5 standard deviations below age-adjusted norms

Mood

18. Current anxiety: 1.5 standard deviations below sex and education-adjusted norms
19. Geriatric Depression Scale score > 4
20. Mood/hope score >1
21. Withdrawal/apathy/vigor score = 3

Functional Status

22. Eats with some help = 0.5; completely unable = 1
23. Dresses with some help = 0.5; completely unable = 1
24. Cares for appearance with some help = 0.5; completely unable = 1
25. Walks with some help = 0.5; completely unable = 1
26. Transfers with some help = 0.5; completely unable = 1
27. Bathes with some help = 0.5; completely unable = 1
28. Uses toilet with some help = 0.5; completely unable = 1
29. Uses telephone with some help = 0.5; completely unable = 1
30. Travels with some help = 0.5; completely unable = 1
SUPPLEMENTAL MATERIAL

31. Shops with some help = 0.5; completely unable = 1
32. Prepares meals with some help = 0.5; completely unable = 1
33. Does housework with some help = 0.5; completely unable = 1
34. Takes medicine with some help = 0.5; completely unable = 1
35. Handles money with some help = 0.5; completely unable = 1

Diseases and medical conditions recorded at time of catheterization

36. Pulmonary disease at baseline
37. Cerebrovascular disease at baseline
38. Renal disease at baseline
39. Congestive heart failure at baseline
40. Diabetes mellitus (type I or II), self-reported updates at follow up visits
42. Dialysis at baseline
43. Hypertension, self-reported updates at follow up visits
44. Hyperlipidemia at baseline
45. Severe/debilitating liver or gi disease at baseline
46. Malignancy at baseline
47. Peripheral vascular disease
48. Acute coronary syndrome, self-reported updates at follow up visits
49. Ejection fraction at baseline <50%

Self-Reported Stroke and TIA

50. Stroke prior to visit, self-reported
51. TIA prior to visit, self-reported
SUPPLEMENTAL MATERIAL

Bloodwork

52. High homocysteine at baseline

53. B12 deficiency at baseline

Social Support

54. Lives alone, self-reported
**eTable 1: Baseline Characteristics of Study Sample by Visit**

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>6 Months</th>
<th>12 Months</th>
<th>30 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>374</td>
<td>344</td>
<td>340</td>
<td>317</td>
</tr>
<tr>
<td><strong>Age at baseline, mean ± SD</strong></td>
<td>71.4 ± 5.9</td>
<td>71.3 ± 5.9</td>
<td>71.3 ± 5.9</td>
<td>71.3 ± 6.0</td>
</tr>
<tr>
<td><strong>Female sex, number (%)</strong></td>
<td>100 (26.7)</td>
<td>91 (26.4)</td>
<td>91 (26.8)</td>
<td>83 (26.2)</td>
</tr>
<tr>
<td><strong>Education years, mean ± SD</strong></td>
<td>12.8 ± 3.8</td>
<td>12.8 ± 3.9</td>
<td>12.8 ± 3.9</td>
<td>12.8 ± 3.8</td>
</tr>
<tr>
<td><strong>Baseline treatment group, number (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CABG</td>
<td>128 (34.2)</td>
<td>120 (34.9)</td>
<td>119 (35.0)</td>
<td>111 (35.0)</td>
</tr>
<tr>
<td>PCI</td>
<td>150 (40.1)</td>
<td>139 (40.4)</td>
<td>137 (40.3)</td>
<td>126 (39.8)</td>
</tr>
<tr>
<td>MT</td>
<td>96 (25.7)</td>
<td>85 (24.7)</td>
<td>84 (24.7)</td>
<td>80 (25.2)</td>
</tr>
<tr>
<td><strong>Frailty Index deficit sum, mean ± SD</strong></td>
<td>8.41 (4.22)</td>
<td>7.93 (4.89)</td>
<td>7.97 (4.96)</td>
<td>8.52 (5.79)</td>
</tr>
<tr>
<td><strong>Frailty Index Score, mean ± SD</strong></td>
<td>.160 (0.080)</td>
<td>.150 (.093)</td>
<td>.151 (.094)</td>
<td>.162 (.110)</td>
</tr>
<tr>
<td><strong>Frailty Index Score, minima - maxima</strong></td>
<td>0.019 - .596</td>
<td>0 - .547</td>
<td>0.019 - .557</td>
<td>0.019 - .692</td>
</tr>
<tr>
<td><strong>Frailty Index Score above 0.3, number (%)</strong></td>
<td>21 (5.6)</td>
<td>26 (7.6)</td>
<td>30 (8.8)</td>
<td>24 (7.6)</td>
</tr>
</tbody>
</table>

Abbreviations: SD=standard deviation, CABG = coronary artery bypass graft, PCI = percutaneous coronary intervention, MT=medical therapy.

* Frailty Index deficit sum is the raw sum of deficits of 53 possible criteria.

† Frailty Index score is the deficit sum divided by the number of nonmissing criteria, 53 if the data is complete.
SUPPLEMENTAL MATERIAL

The table below describes the average change among those increasing or decreasing in frailty. Cross-sectional studies in older community dwelling populations describe average increase in frailty to be approximately .02 to .03 per year of age increase. More recent longitudinal studies have depicted the rate of increase to be exponential, with the number of deficits increasing by a factor of 1.035 over a person’s lifetime.

eTable 2: Mean Change in Score for Those Increasing or Decreasing in FI Scores, Stratified by FI Score at Beginning of Time Interval

<table>
<thead>
<tr>
<th>FI Score category</th>
<th>Change Type</th>
<th>Baseline to Month 6</th>
<th>Month 6 to Month 12</th>
<th>Month 12 to Month 30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean change in score (Standard deviation)</td>
<td>Mean change in score (Standard deviation)</td>
<td>Mean change in score (Standard deviation)</td>
</tr>
<tr>
<td>0-.06</td>
<td>Decrease*</td>
<td>-.028 (0)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Increase</td>
<td>.047 (.011)</td>
<td>.048 (.018)</td>
<td>.051 (.021)</td>
</tr>
<tr>
<td>.06-.12</td>
<td>Decrease</td>
<td>-.043 (.013)</td>
<td>-.039 (.013)</td>
<td>-.041 (.009)</td>
</tr>
<tr>
<td></td>
<td>Increase</td>
<td>.055 (.053)</td>
<td>.042 (.016)</td>
<td>.057 (.031)</td>
</tr>
<tr>
<td>.12-.18</td>
<td>Decrease</td>
<td>-.051 (.020)</td>
<td>-.041 (.015)</td>
<td>-.045 (.016)</td>
</tr>
<tr>
<td></td>
<td>Increase</td>
<td>.064 (.044)</td>
<td>.052 (.027)</td>
<td>.063 (.033)</td>
</tr>
<tr>
<td>.18-.24</td>
<td>Decrease</td>
<td>-.068 (.026)</td>
<td>-.053 (.021)</td>
<td>-.043 (.011)</td>
</tr>
<tr>
<td></td>
<td>Increase</td>
<td>.073 (.091)</td>
<td>.057 (.038)</td>
<td>.059 (.036)</td>
</tr>
<tr>
<td>.24+</td>
<td>Decrease</td>
<td>-.084 (.034)</td>
<td>-.064 (.036)</td>
<td>-.070 (.027)</td>
</tr>
<tr>
<td></td>
<td>Increase</td>
<td>.100 (.067)</td>
<td>.063 (.041)</td>
<td>.108 (.065)</td>
</tr>
</tbody>
</table>

* The standard deviation is 0 in the first time interval, and the means and standard deviations are not available in second and third time intervals due to insufficient sample in this category.
SUPPLEMENTAL MATERIAL

References:


SUPPLEMENTAL MATERIAL


