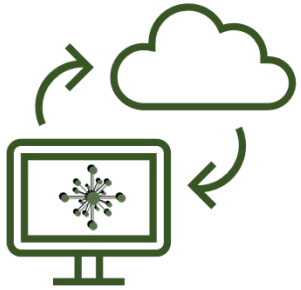
Leveraging VA Data to Develop the VA-Frailty Index



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VA HEALTH CARE Defining EXCELLENCE in the 21st Century

Brigham and Women's Hospital
Founding Member, Mass General Brigham

HARVARD MEDICAL SCHOOL

Developing the VA-FI: variables were selected according to established criteria, with Geriatrician input

1. Related to health status
2. Increased in prevalence with age
3. Not saturated before age 65
4. Cover a range of health systems
5. If repeated measures, variables must be the same at each assessment

VA-FI domains:

1. Function
2. Morbidity
3. Cognition & Mood
4. Sensory impairment
5. Other/Geriatric

Mitnitski AB, et al. Scientific World Journal. 2001.
Rockwood K, et al. J Gerontol A Biol Sci Med Sci 2007.
Searle et al BMC Geriatr 2008.

31-item VA-FI using VA claims, augmented with CMS data

- **Function**:

  - Arthritis/gout
  - Falls
  - Fatigue
  - Use of DME
  - Muscle wasting/cachexia
  - Gait abnormality
  - Parkinson's Disease
  - Peripheral vascular disease

- **Morbidity**:

  - Anemia
  - Atrial Fibrillation
  - Cancer
  - Chronic kidney disease
  - Coronary artery disease
  - Diabetes
  - Heart Failure
  - Hypertension
  - Liver disease
  - Lung disease
  - Osteoporosis
  - Stroke/TIA
  - Thyroid disorder

- **Sensory**:

  - Vision loss
  - Hearing loss
  - Peripheral neuropathy

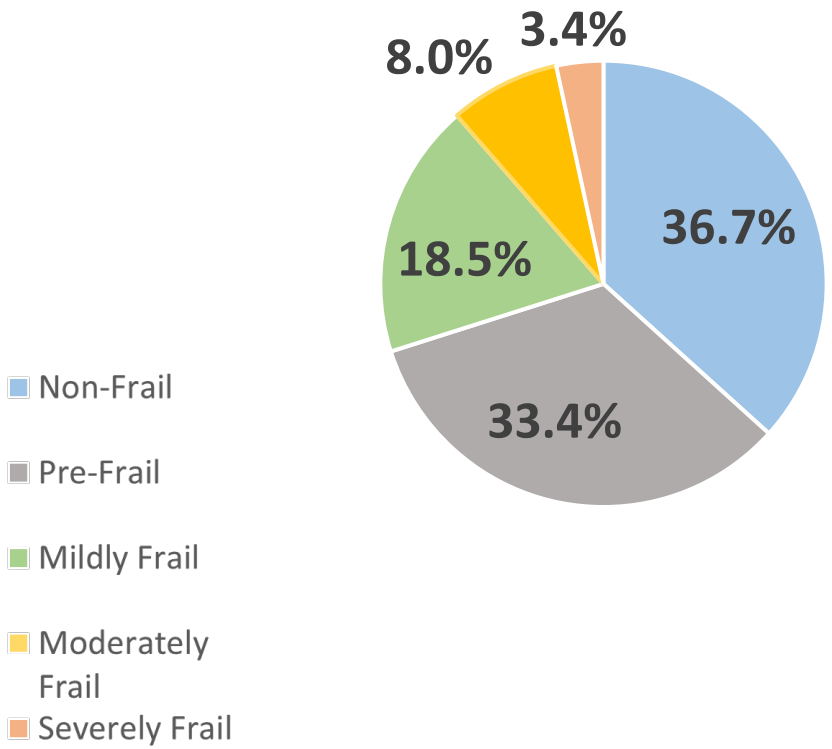
- **Memory/Mood**:

  - Dementia
  - Depression
  - Anxiety

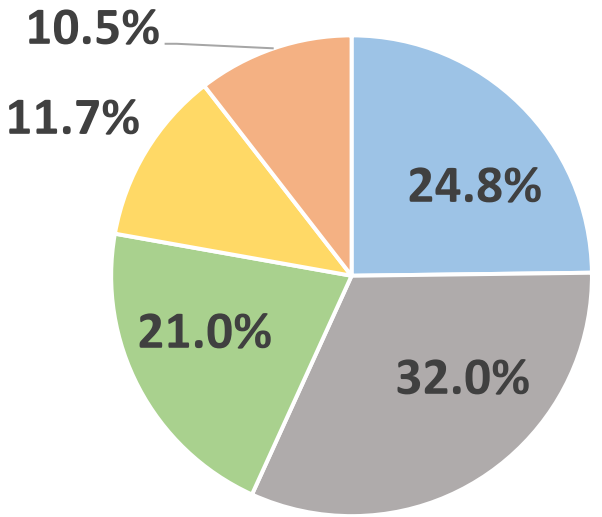
- **Other/Geriatric:**
  - Weight loss
  - Chronic Pain
  - Failure to thrive
  - Incontinence

The prevalence of frailty in VA changed over time: increased by ~50% since 2002

Prevalence of Frailty 2002: 30%
N=1,606,750
Mean age 75, 98% male



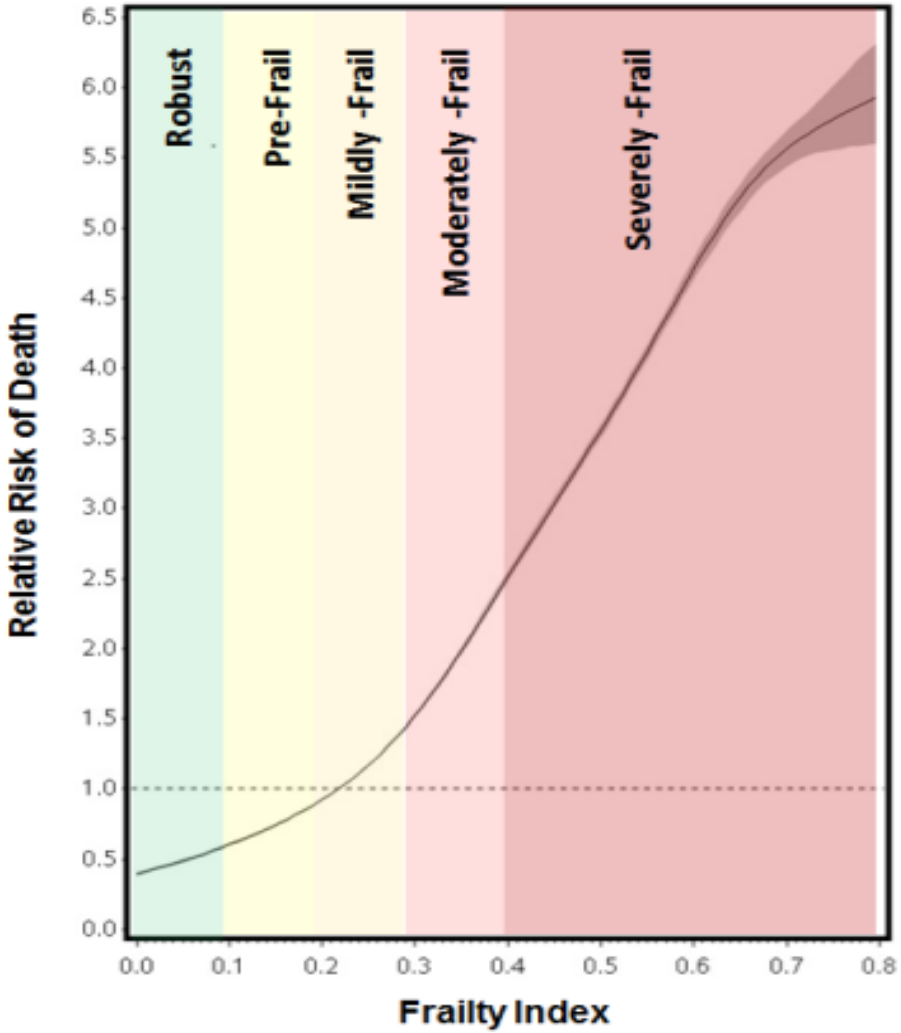
Prevalence of Frailty in 2018: 43%
N=2,359,207
Mean age 76, 97% male



Orkaby et al. J Gerontol A Biol Sci Med Sci. 2019.
Cheng … Orkaby. J Gerontol A Biol Sci Med Sci. 2021.

The VA-FI identifies those at increased risk of mortality and can reset life expectancy estimates

2-yr risk of all-cause mortality 2012-14

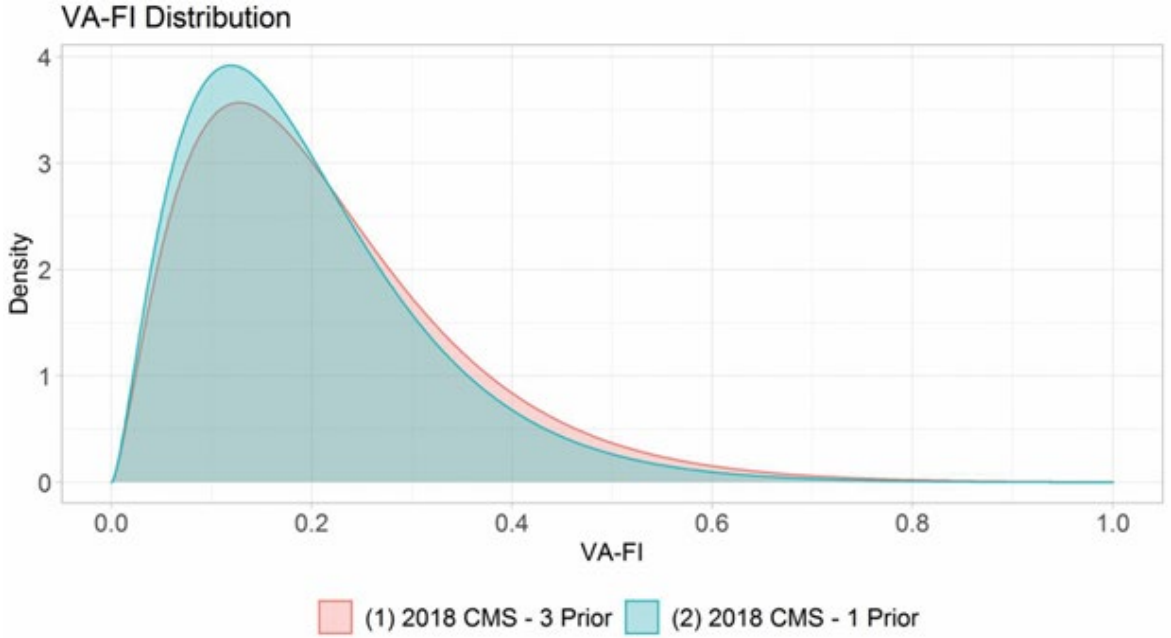


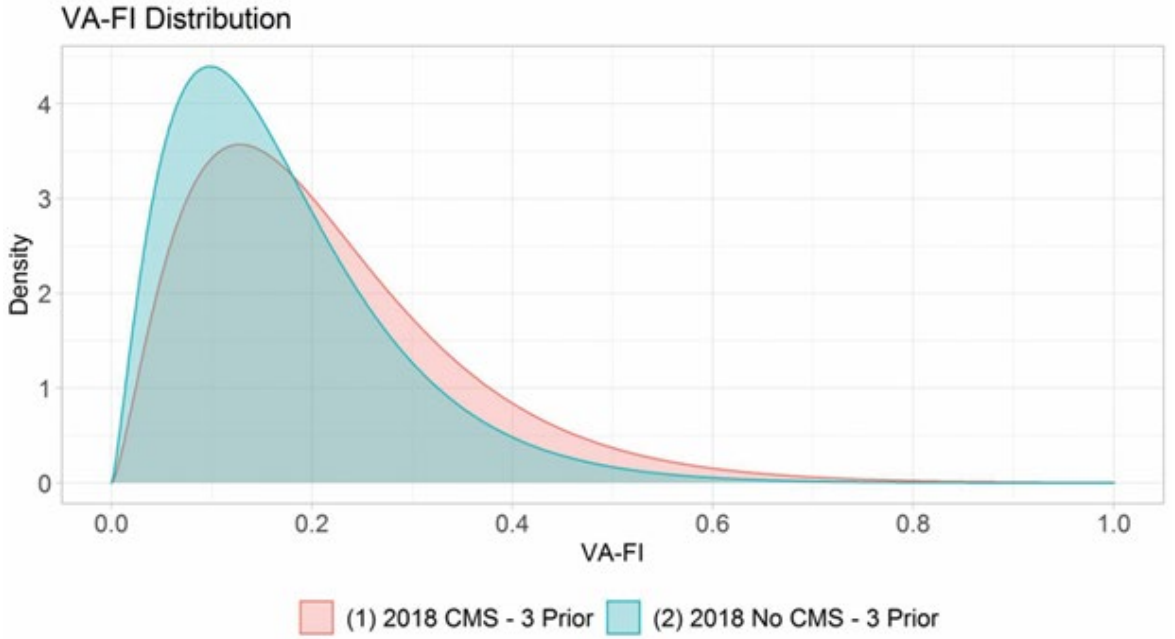
2002	Median Survival Time (Years)					
	Men			Women		
Frailty Score	Age 65-74	Age 75-84	Age ≥85	Age 65-74	Age 75-84	Age ≥85
≤0.1	13.0	10.4	6.4	19.2	11.6	7.4
>0.1 - ≤0.2	12.4	8.7	5.7	15.1	10.5	6.5
>0.2 - ≤0.3	9.5	7.0	4.8	12.0	8.8	5.6
>0.3 - ≤0.4	6.8	5.4	3.8	8.5	7.0	4.5
>0.4	4.6	3.8	2.8	6.0	5.1	3.7
Overall	12.9	8.0	4.9	15.6	9.5	5.7

Orkaby et al. J Gerontol A Biol Sci Med Sci 2019.

Data challenges

- How many years of look back do we need to calculate an FI?
- What happens if we do/don't include data from outside VHA?
  - 1 in 4 Veterans are reclassified to higher frailty category with CMS data
  - Yet - association with mortality is maintained



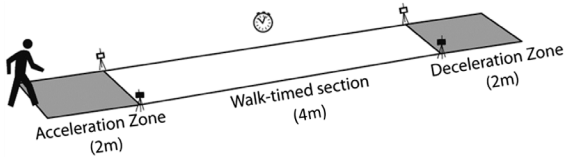


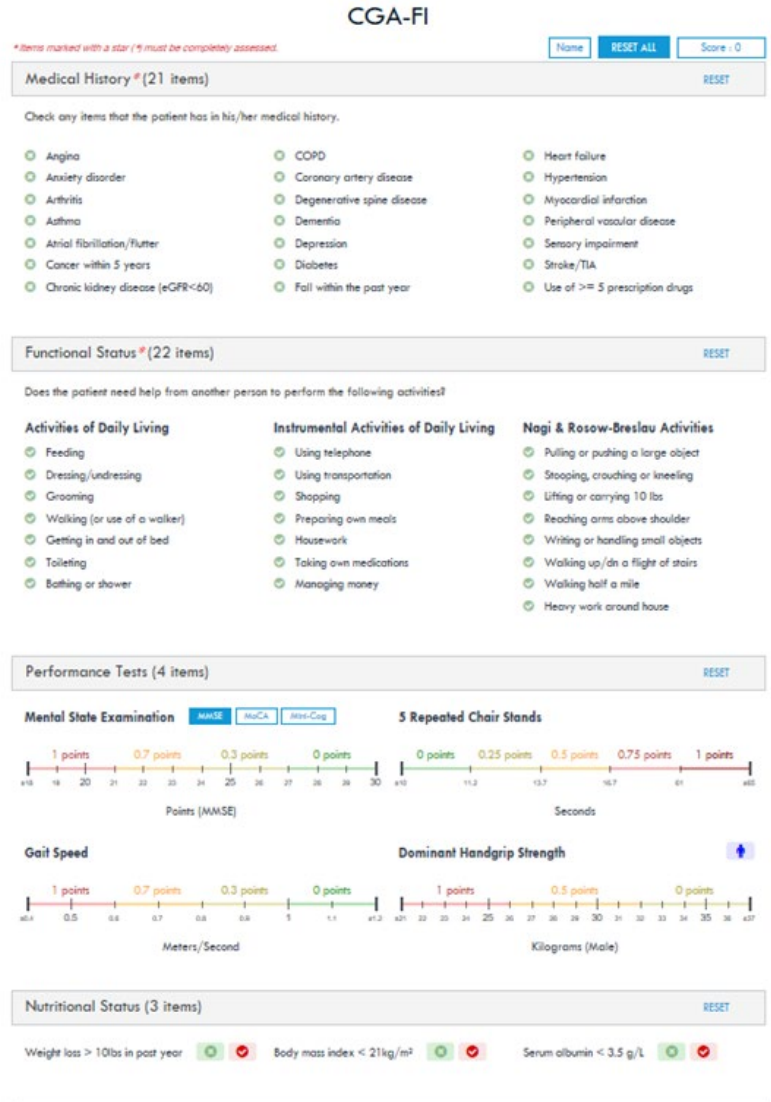
Cheng & DuMontier et al. J Gerontol A Biol Sci Med Sci 2021.

VA-FI vs clinical frailty measures: Construct Validity

- How well does the VA-FI correlate with clinical frailty assessments?
- 3 VA Boston clinics:
  - Primary Care Geriatrics
  - Geriatric Cardiology
  - Geriatric Oncology
- 132 patients, mean age 81

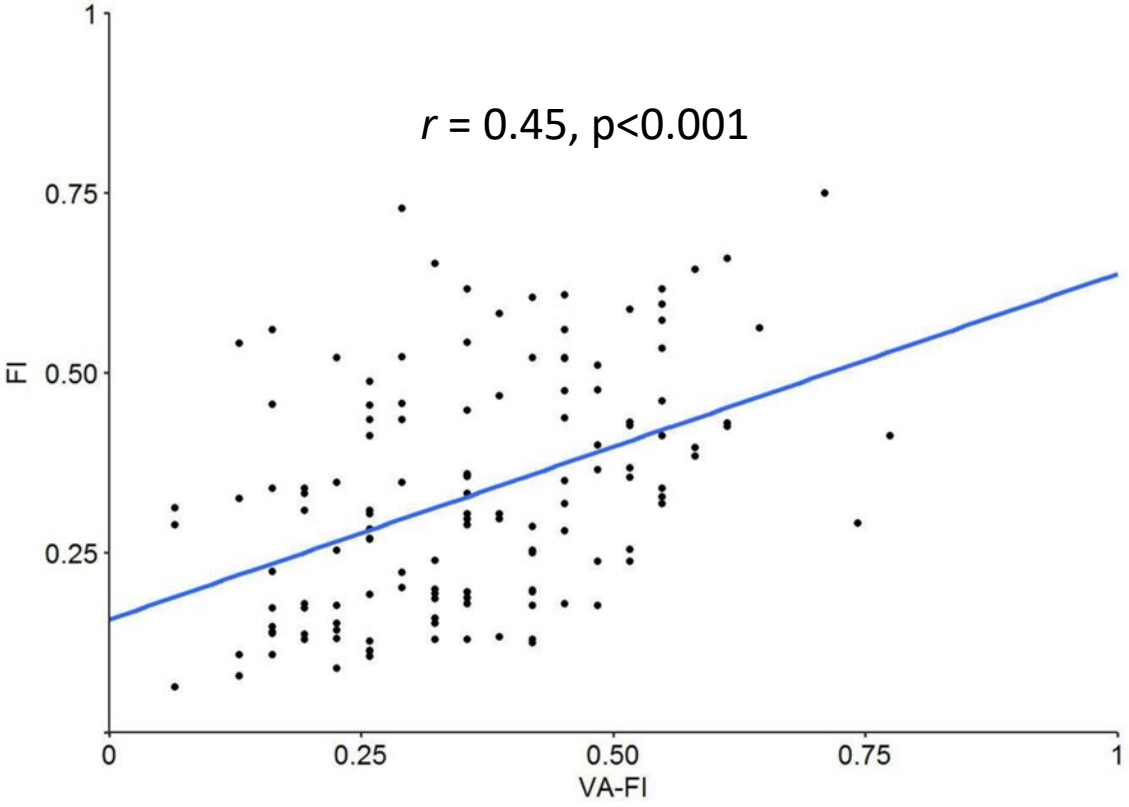
Images and titles courtesy of Clinical Frailty Scale Geriatric Medicine Research, Dalhousie University, Halifax, Canada





Developed by Dr. Dae Kim:
https://efrailty.hsl.harvard.edu/tools/CGA-FI/index.html

VA-FI vs in person Frailty measures: Construct Validity

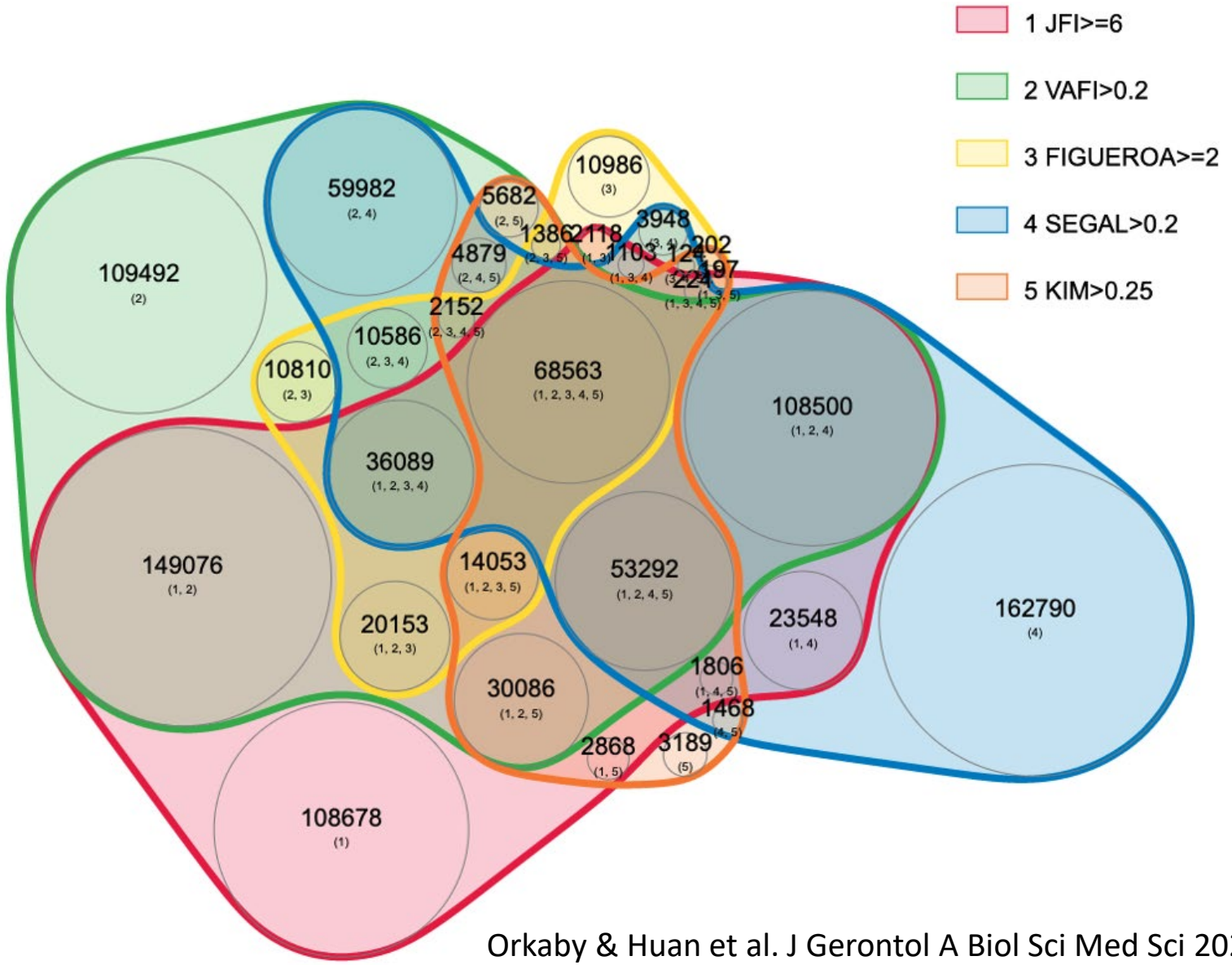


Clinical frailty measures	Association between VA-FI and clinical frailty measure, univariable (effect estimate and 95% CI)	Association between VA-FI and clinical frailty measure, adjusted for Age, Race, and Charlson (effect estimate and 95% CI)
CGA-FI (continuous)	Beta 0.05 (0.03-0.07)	Beta 0.04 (0.02-0.06)
Clinical Frailty Scale (ordinal categories 1-4, 5-6, ≥7)	OR 1.70 (1.26, 2.91)	OR 1.65 (1.21, 2.25)
ADL Dependency (assistance/dependency in 1 or more ADLs)	OR 1.61 (1.22-2.12)	OR 1.56 (1.17-2.09)
IADL Dependency (assistance/dependency in 1 or more IADLs)	OR 1.69 (1.25-2.29)	OR 1.76 (1.27-2.46)
4-meter gait speed (continuous)	Beta -0.07 (-0.11,-0.02)	Beta -0.06 (-0.12, -0.01)

Dumontier & Hennis et al. JAGS 2023.

How do claims-based frailty indices compare in VA data? Each identifies somewhat different people

- 2.6 Million Veterans, ≥ 65 seen in 2014
- 80% White, 9% Black
- 7 to 26% frail
- Only ~3% frail by all CFIs

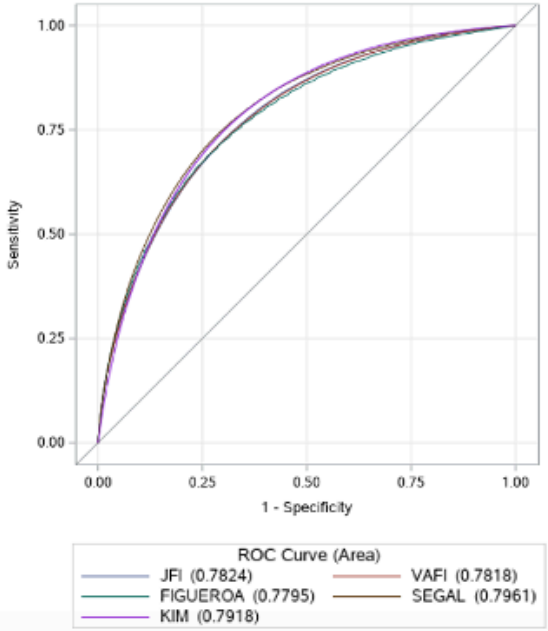


Orkaby & Huan et al. J Gerontol A Biol Sci Med Sci 2023.

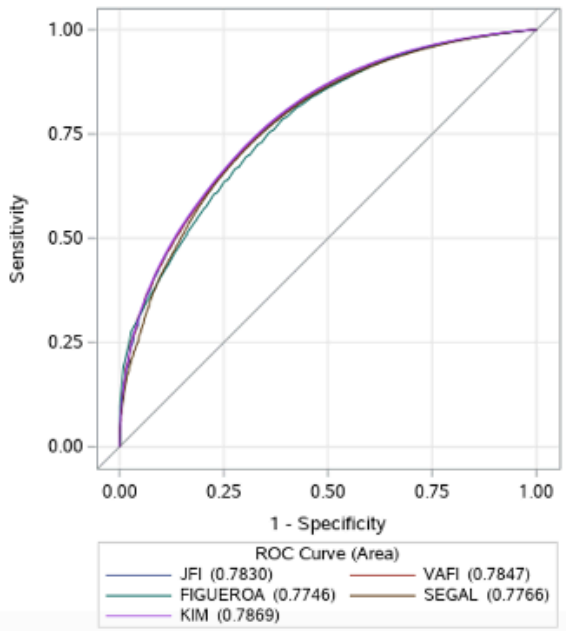
Geriatrics & Extended Care Data & Analysis Center

Yet – all CFIs identify increased risk of long-term institutionalization and mortality

Panel C. Adjusted LTI



Panel D. Adjusted Death



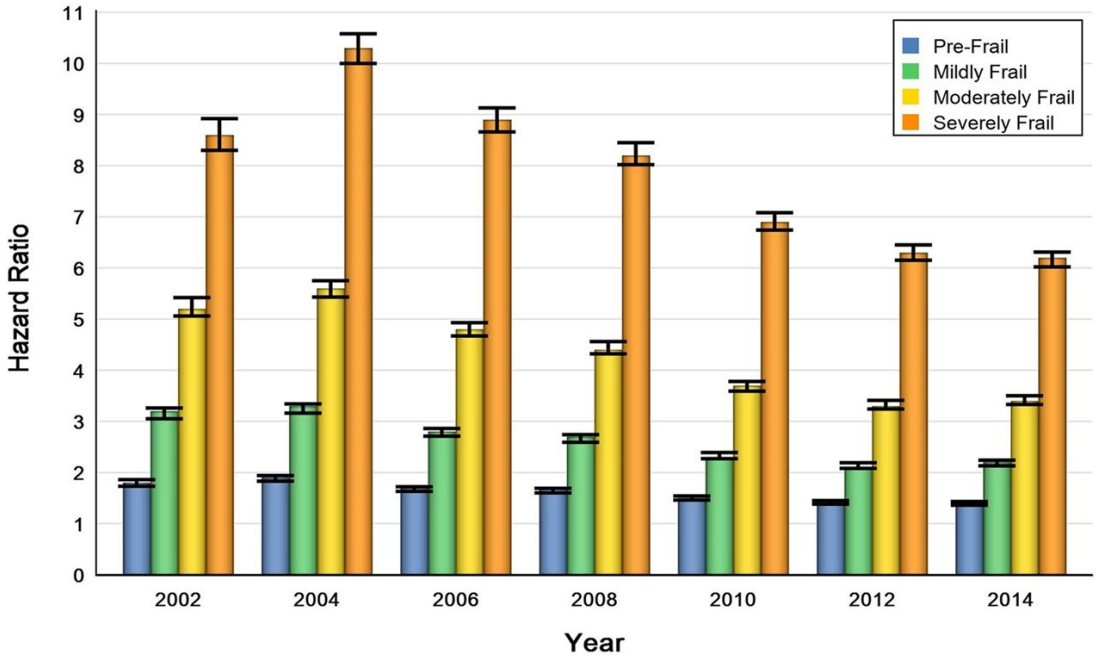
Area Under the Curve (AUC)	JFI	VAFI	Figueroa	Segal	Kim
AUC – for LTI					
Frailty	0.69	0.71	0.66		
Frailty + age + sex	0.77	0.77	0.77		
Frailty + utilization	0.71	0.72	0.69		0.73
Frailty + age + sex + utilization	0.78	0.78	0.78	0.80	0.79
AUC – for Death					
Frailty	0.67	0.70	0.60		
Frailty + age + sex	0.78	0.78	0.77		
Frailty + utilization	0.68	0.70	0.63		0.70
Frailty + age + sex + utilization	0.78	0.78	0.77	0.78	0.79

Orkaby & Huan et al. J Gerontol A Biol Sci Med Sci 2023.

VA-FI has become a powerful tool for epidemiologic research across VA

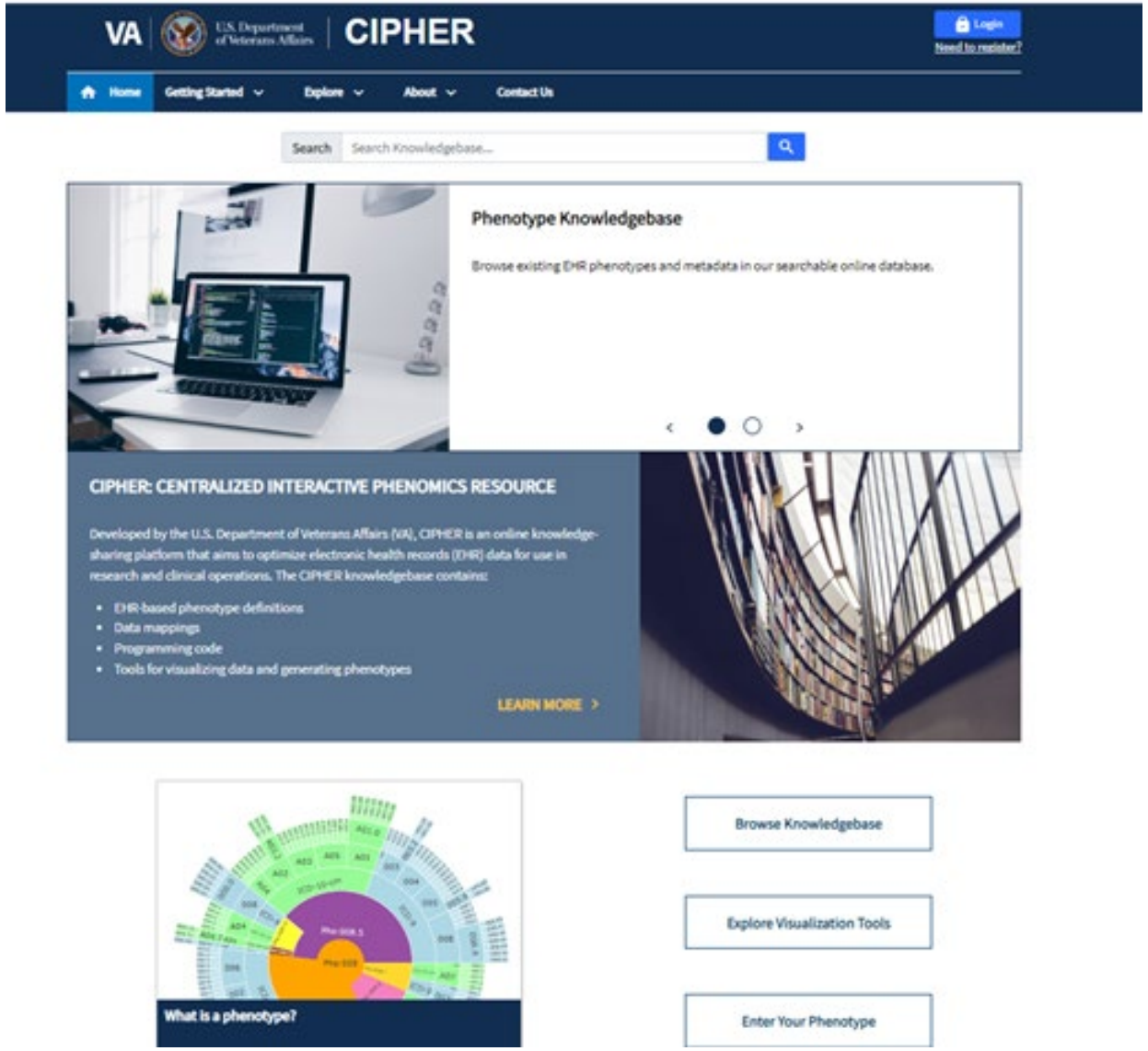
- Atrial Fibrillation
- Anticoagulation
- Cancer
- Cardiovascular disease
- COVID and flu
- Diabetes
- Institutionalization
- Military exposures and aging
- Surgery
- Suicide risk
- Elder abuse, social determinants of health

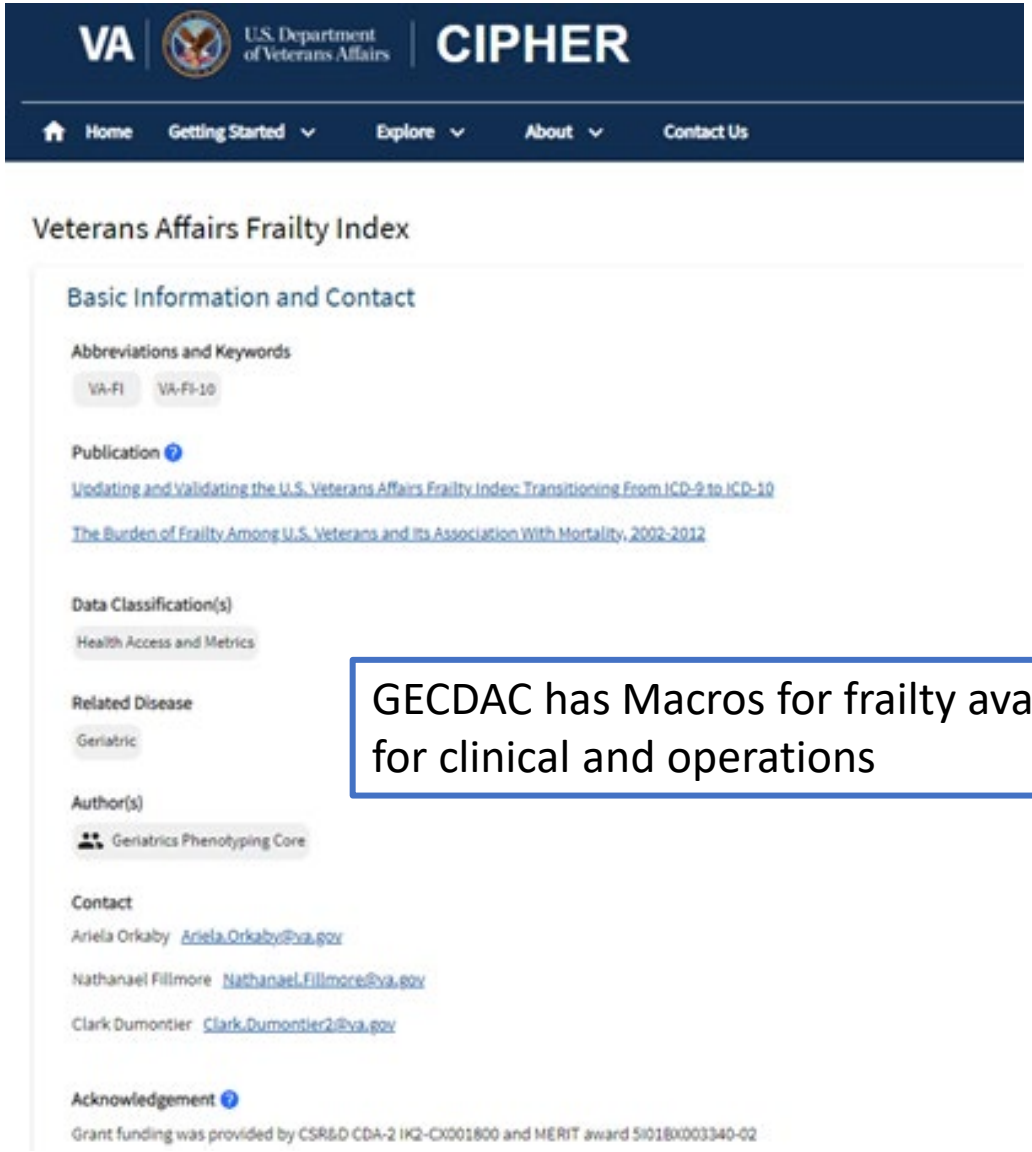
Association between VA-FI level and CV Mortality Over Time



Shrauner W … Orkaby AR. Eur Heart J. 2021.

Making the VA-FI and other frailty tools accessible

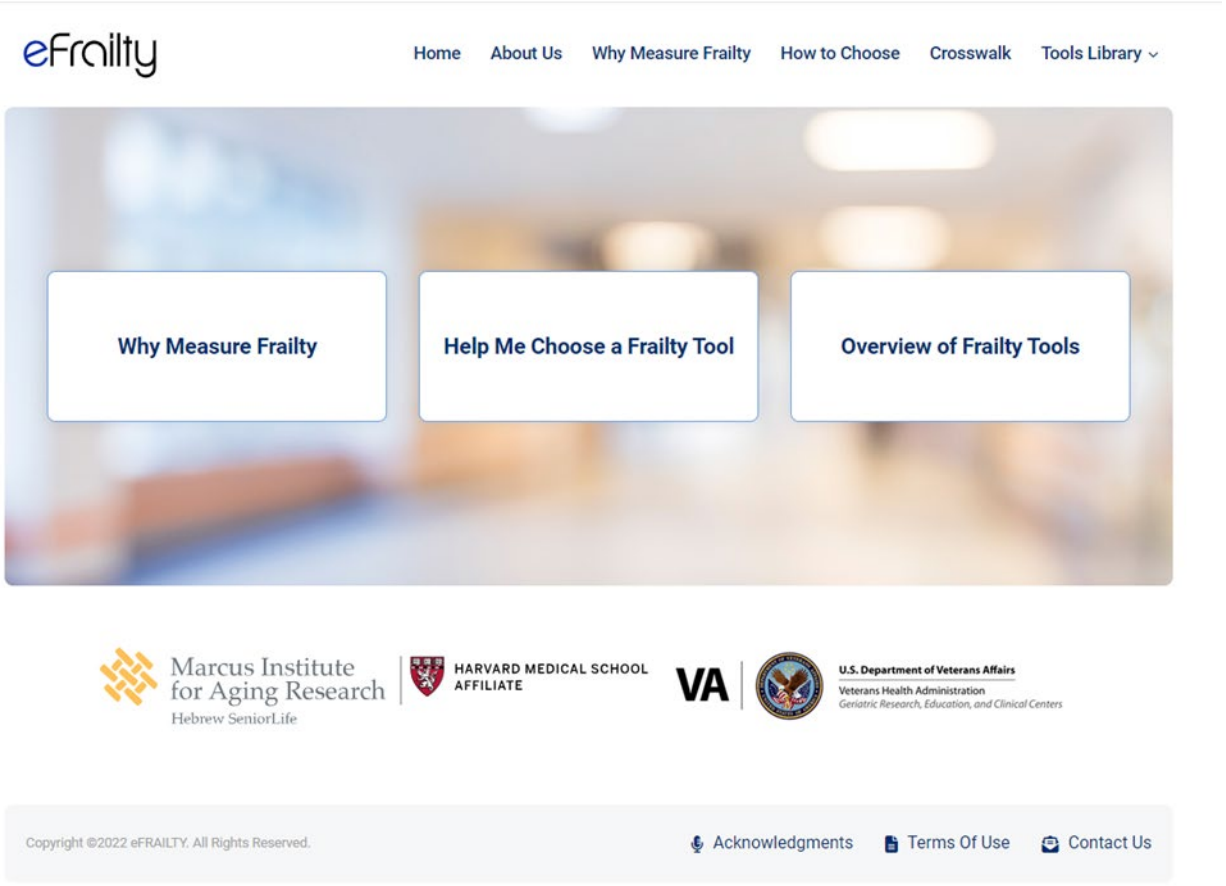




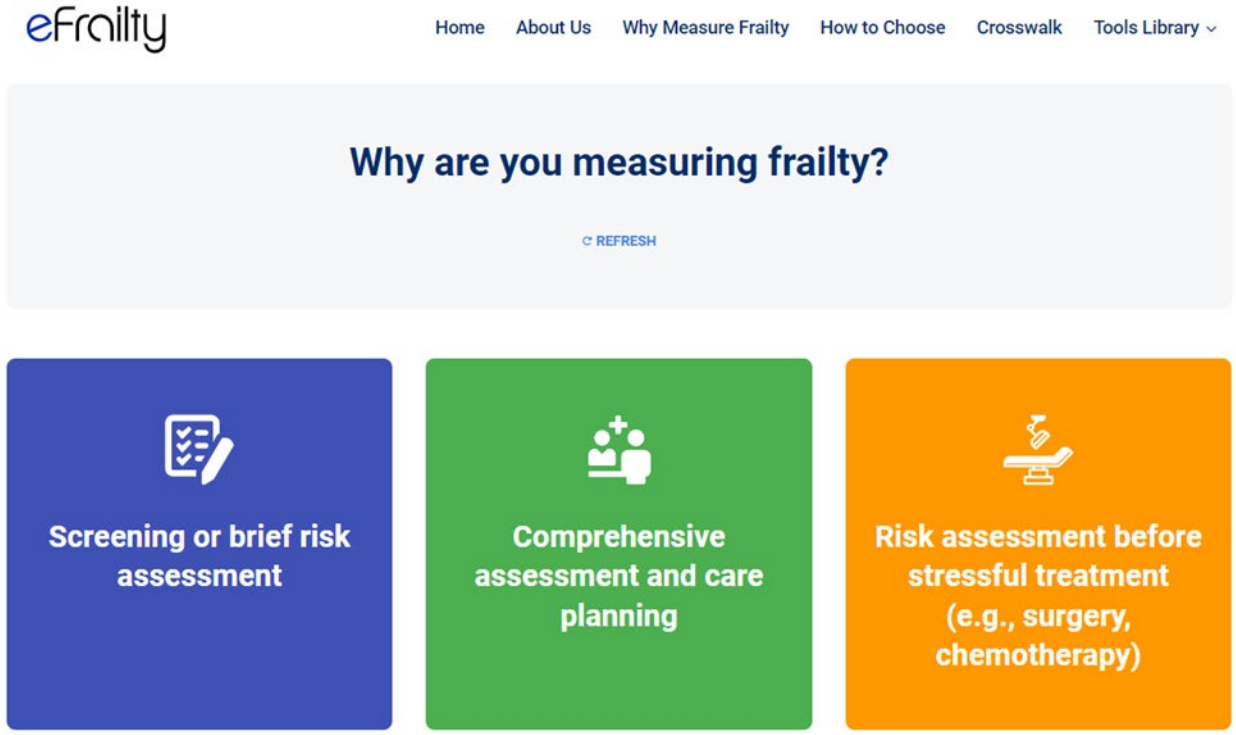
GECDAC has Macros for frailty available for clinical and operations

https://phenomics.va.ornl.gov/web/

https://github.com/bostoninformatics/va_frailty_index



eFrailty.org



Kim … Orkaby et al. JAGS 2024.