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COMMENTARY

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eFrailty: Making frailty assessment accessible to clinicians and researchers

Dae Hyun Kim MD, ScD[1,2,3] | **Megan Cheslock MD**[4] | **Stephanie M. Sison MD, MBA**[1,5] | **Ariela R. Orkaby MD, MPH**[3,6,7] | **Andrea Wershof Schwartz MD, MPH**[3,6,7,8]

[1]Hinda and Arthur Marcus Institute for Aging Research, Hebrew SeniorLife, Boston, Massachusetts, USA

[2]Division of Gerontology, Department of Medicine, Beth Israel Deaconess Medical Center, Boston, Massachusetts, USA

[3]Harvard Medical School, Boston, Massachusetts, USA

[4]Edith Nourse Rogers Memorial Veterans Hospital, Bedford, Massachusetts, USA

[5]University of Massachusetts Chan Medical School, Worcester, Massachusetts, USA

[6]New England Geriatric Research, Education, and Clinical Center, Veterans Affairs Boston Healthcare System, Boston, Massachusetts, USA

[7]Division of Aging, Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts, USA

[8]Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, USA

Correspondence
Dae Hyun Kim, Hinda and Arthur Marcus Institute for Aging Research, Hebrew SeniorLife, 1200 Centre Street, Boston, MA 02131, USA.
Email: daehyunkim@hsl.harvard.edu

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"Which frailty assessment tool should I use?" This is the most frequently asked question from clinicians and researchers who are aware of the concept of frailty but are unfamiliar with the dozens of definitions and tools available for assessment. Even when one chooses a specific tool, locating it on the web and following instructions for scoring and interpretation can be cumbersome at the point of care. As geriatricians, researchers, and educators who measure, study, and teach frailty, we felt the need to fill this gap by creating a "one-stop shop" for commonly used frailty assessment tools. We are excited to introduce the product of our efforts over the past two years—eFrailty.org (Figure 1).

"Our main goal in creating eFrailty is to make frailty assessment accessible to clinicians and researchers, within and outside geriatrics and aging research."

To achieve this goal, we aimed to (1) summarize the features of commonly used, validated frailty assessment tools; (2) create web-based calculators to allow real-time scoring and interpretation at the point of care; and (3) help users choose the most appropriate tool for their clinical situation.

First, we curated 15 commonly used and validated frailty assessment tools (Table 1) through team consensus, informed by the literature (original research articles reporting each tool)[1] and our clinical experience. Since the deficit accumulation frailty index (FI) has been operationalized in various ways due to adaptations made depending on the clinical and research datasets used, we chose the version based on items routinely collected in a comprehensive geriatric assessment (CGA).[2] For each

Ariela R. Orkaby and Andrea Wershof Schwartz equally contributed to this work.

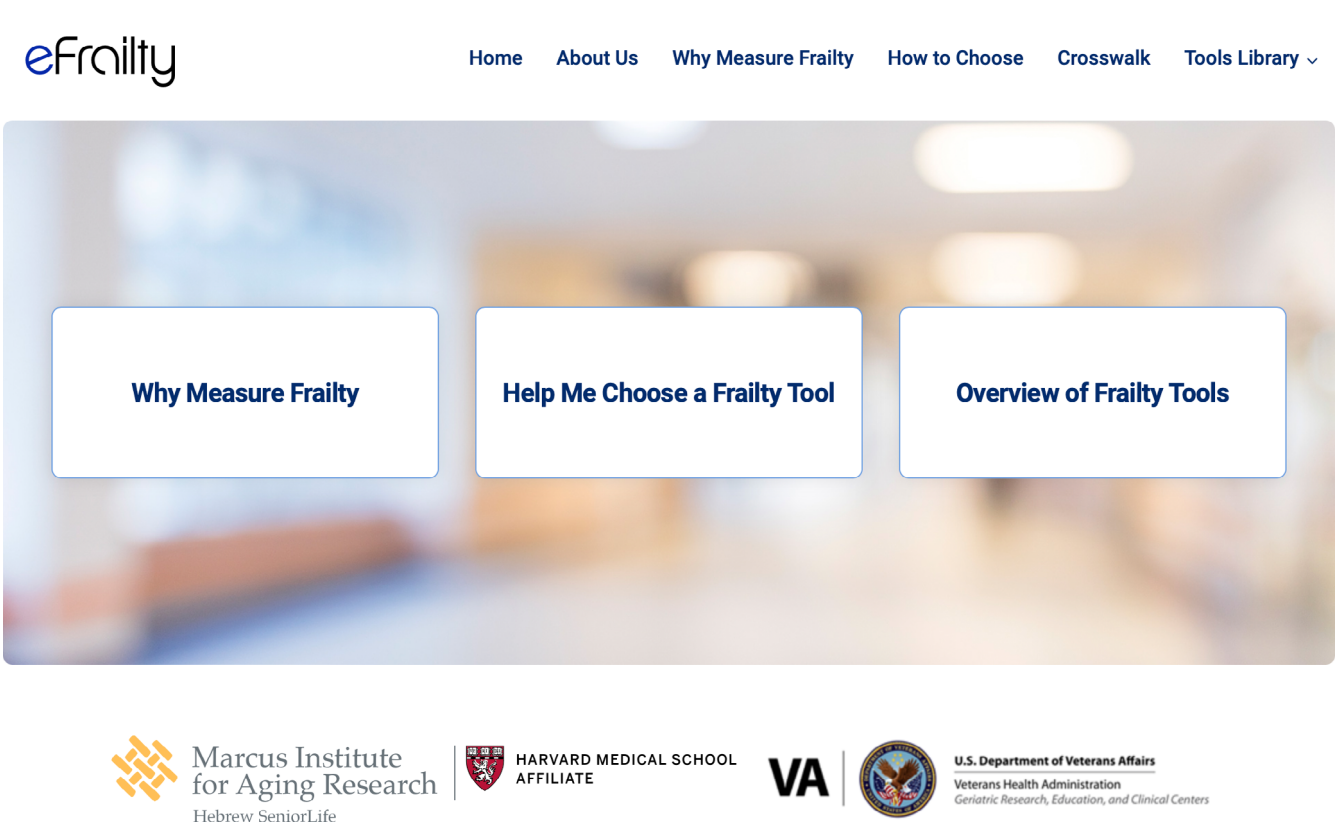

FIGURE 1 eFrailty.org website. To address the pressing need of having frailty assessment tools readily accessible at point of care, we created eFrailty.org, a "one-stop shop" for 15 commonly used frailty assessment tools.

assessment tool, we indicate the average time to administer each assessment tool, unique features, number of test items, and included domains. The site also features a crosswalk to allow comparison of scores across nine common frailty assessment tools.[3]

Second, we created web-based interactive calculators for scoring and interpreting each frailty tool within the website. For example, for the Fried physical phenotype, we applied sex- and height-specific cutpoints for slow gait, sex- and body mass index-specific cutpoints for weak grip strength, and kilocalorie cutpoints from selected items of the Minnesota Leisure Time Activity Questionnaire to determine low physical activity.[4,5] These cutpoints are automatically incorporated within the calculator such that, without a calculator, manually identifying these cutpoints and computing scores in clinical practice can be otherwise challenging and time-insensitive.

Third, we developed an algorithm to guide the choice of frailty assessment in different clinical settings (Figure 2). We identified three clinical scenarios: screening or brief risk assessment ("does this patient have frailty or an elevated risk for adverse health outcomes?"), comprehensive assessment and care planning ("what interventions and supportive services does this patient need to reverse frailty or prevent adverse health outcomes?"), and risk assessment before stressful treatment ("what is this patient's risk for experiencing adverse outcomes after surgery or chemotherapy?"). For screening in primary care or acute care settings, a simple tool that can be completed within 3–5 min based on self-report with or without a brief physical performance test (e.g., chair stands) is appropriate. For comprehensive assessment and care planning, tools based on a CGA or similar multi-domain assessment, which often require cognitive tests and physical performance tests, are needed to identify modifiable causes of frailty and tailor interventions to prevent frailty progression and optimize health. For risk stratification before stressful treatment, such as surgery or chemotherapy, it is preferable to choose a tool validated in the patient population undergoing the treatment of interest. In each scenario, we recommend one main tool and several alternative tools which users can opt to choose from.

We briefly illustrate how the eFrailty algorithm can be used in two clinical scenarios.

1. An 80-year-old woman with multimorbidity returns to the primary care physician's office for a Medicare annual wellness visit. The clinician answers a series of questions prompted by the "Help Me Choose a Frailty Tool" algorithm on eFrailty. This leads to the Study of

TABLE 1 Domains of 15 frailty assessment tools included in eFrailty.

Frailty assessment tool	Time (mins)	Mobility balance	Strength	Physical activity	Endurance	Nutrition	Cognition	Mood	Disability	Medical history	Social
Tools for general population											
FRAIL Questionnaire	3	X	X		X	X				X	
Study of Osteoporotic Fracture Index	3		X		X	X					
Clinical Frailty Scale	3	X		X	X		X		X	X	
PRISMA-7	3	X		X					X	X	X
Vulnerable Elder Survey-13	5	X	X						X	X	
Frailty Phenotype	5	X	X	X	X	X					
Tilburg Frailty Indicator	5	X	X		X	X	X	X		X	X
Groningen Frailty Indicator	5	X		X		X	X			X	X
Edmonton Frail Scale	10	X				X	X	X	X	X	X
CGA-FI	30	X	X	X		X	X	X	X	X	
Tools for specific population											
Risk Analysis Index	3	X				X	X		X	X	
G-8	3	X				X	X			X	
Liver Frailty Index	5	X	X								
Myeloma Frailty Score	5								X	X	
Essential Frailty Toolset	10		X				X			X	

Abbreviations: CGA-FI, comprehensive geriatric assessment-based frailty index; FRAIL, Fatigue, Resistance, Ambulation, Illness, and Loss of Weight scale.

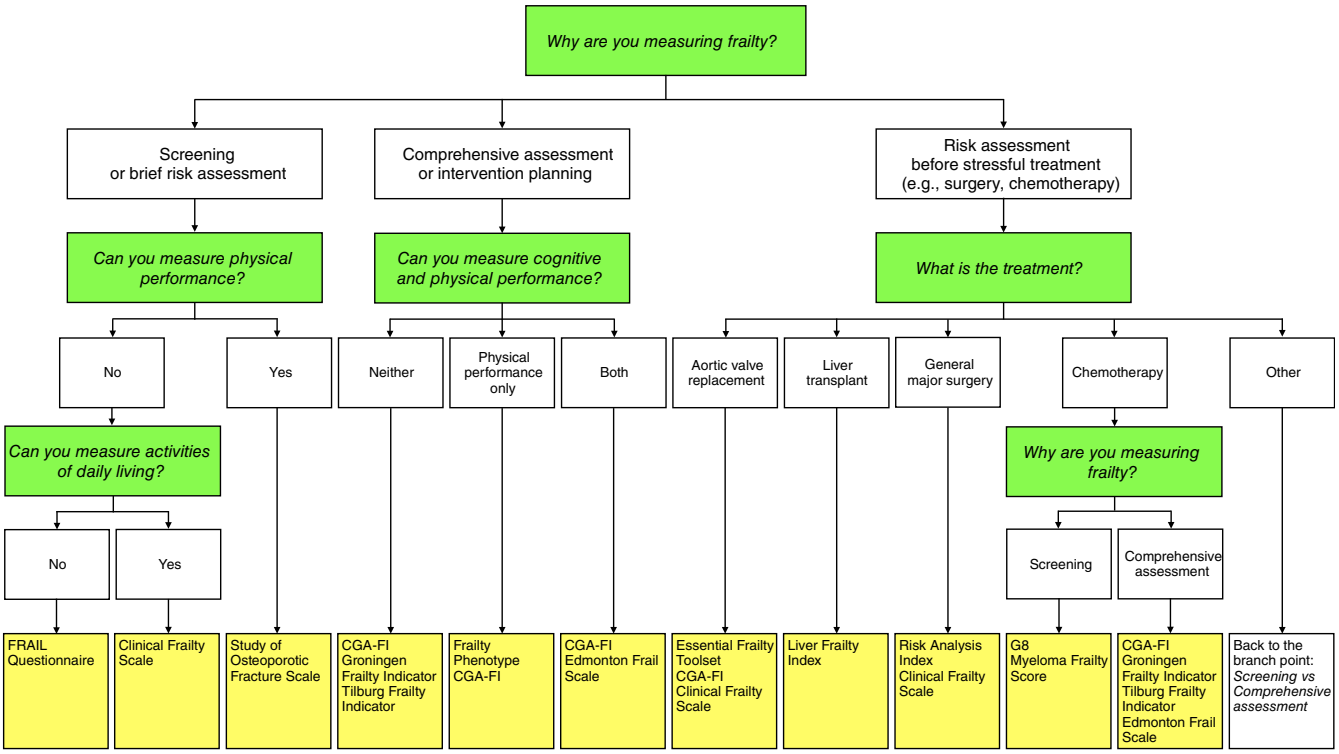

FIGURE 2 An algorithm to guide choice of frailty assessment tools. This algorithm, developed by the authors, guides the choice of frailty tools in different clinical scenarios: screening or brief risk assessment, comprehensive assessment and care planning, and risk assessment before stressful treatment. For screening in primary care or acute care settings, a simple tool that can be completed within 3–5 minutes based on self-report with or without a brief physical performance test is appropriate. For comprehensive assessment and care planning, tools based on a comprehensive geriatric assessment (CGA) or similar multi-domain assessment are needed to identify modifiable causes of frailty and tailor interventions to the patient's health deficits. For risk stratification before stressful treatment, it is preferable to choose a tool validated in the patient population undergoing the treatment of interest. CGA-FI, comprehensive geriatric assessment-based frailty index; FRAIL, Fatigue, Resistance, Ambulation, Illness, and Loss of Weight scale.

Osteoporotic Fracture (SOF) index as the primary recommended tool, and several alternatives for frailty screening, including the Fatigue, Resistance, Ambulation, Illness, and Loss of Weight (FRAIL) scale, Clinical Frailty Scale, PRISMA-7, and Vulnerable Elder Survey-13. The SOF assessment reveals a score of 2, consistent with frailty. Concerned about the positive screening, the clinician refers the patient for a geriatric consultation. During the consultation visit, a geriatrician performs a CGA which includes assessment of cognition and physical performance. After answering questions prompted by the eFrailty algorithm, the CGA-FI is completed indicating moderate frailty. Interventions can then be tailored to target the domains with high levels of impairment.

2. An 85-year-old man recently diagnosed with symptomatic severe aortic stenosis presents to a cardiology clinic for consideration for transcatheter aortic valve replacement (TAVR). Given his advanced age and multimorbidity, his cardiologist administers the Essential Frailty Toolset,[6] which the eFrailty algorithm directs the user to as it predicts death or functional decline at 1 year after transcatheter or surgical aortic valve replacement. The cardiologist refers the patient to a geriatrician for assistance in further assessment to guide shared decision-making. The geriatrician completes the CGA-FI, which can predict functional recovery trajectories after TAVR.[7] If TAVR aligns with the patient's preferences and expected functional trajectory is acceptable to the patient, the geriatrician can develop a personalized treatment plan to optimize health status before the procedure based on domain-specific impairments identified using CGA-FI and plan for post-procedural care and follow-up.

Users should be aware that the assessment tools included on eFrailty are not intended to be a comprehensive list of validated frailty assessments. We did not include frailty scores that are solely calculated from existing healthcare data, such as claims-based FIs and electronic FIs.[8] Because the calculators were created by our team based on the information reported in the published articles, any revisions or updates to the tools after the publication of the original articles might not be reflected.

The frailty tool selection algorithm (Figure 2) for different clinical scenarios is based on the opinions of the authors, informed by our collective clinical experience, rather than research evidence. Therefore, the content of eFrailty should be used as a guide but not as a replacement for professional judgment.

In conclusion, eFrailty.org is designed to address the pressing need of having frailty assessment tools readily accessible at point of care. This resource will empower clinicians to discuss frailty with their patients, personalize clinical management, and facilitate informed decision-making about treatment based on physiologic vulnerability, rather than chronological age. It will also enable researchers to conduct valid assessments of frailty, generating clinically relevant evidence for older adults at risk for or living with frailty. Furthermore, eFrailty can be useful in training and educating medical students, trainees, and clinicians by providing a centralized resource on frailty assessments. We hope eFrailty represents a significant step forward in making standardized frailty assessments possible, an essential step toward frailty-guided and person-centered clinical care.

AUTHOR CONTRIBUTIONS

Drafting of the manuscript: Dae Hyun Kim. Critical revision of the manuscript for important intellectual content: Dae Hyun Kim, Megan Cheslock, Stephanie M. Sison, Ariela R. Orkaby, and Andrea W. Schwartz. Administrative, technical, or material support: Dae Hyun Kim, Ariela R. Orkaby, and Andrea W. Schwartz. Study supervision: Dae Hyun Kim.

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ORCID

Dae Hyun Kim https://orcid.org/0000-0001-7290-6838
Andrea Wershof Schwartz https://orcid.org/0000-0002-2076-6068

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