

PATIENT-CENTERED OUTCOMES RESEARCH TRUST FUND (OS-PCORTF) PROJECT SUMMARY TESTING & VALIDATION OF A FRAILTY ALGORITHM WITH CLAIMS DATA AND CASE STUDIES ON USING EHR DATA TO IDENTIFY FRAILTY

BACKGROUND & PROBLEM STATEMENT

Frailty in Older Adults & Unmet Needs in Geriatric Care

Frailty is a clinical syndrome that is characterized by a constellation of symptoms, including loss of strength, low energy, and weight loss. Frail individuals are vulnerable to negative health outcomes, such as falls, disability, and fractures and have an increased risk of mortality, higher health care use and spending. A common approach to measure frailty is to count an accumulation of “deficits” including symptoms such as hearing or vision loss, abnormal laboratory values (e.g., low calcium), or difficulty engaging in activities of daily living (ADL). However patient function such as ADL information is not systematically obtained in routine clinical encounters. Claims and/or EHR-based frailty algorithms using diagnoses and service codes, potentially added to the Chronic Condition Warehouse (CCW) can help identify at-risk persons for in-depth assessment, early interventions, inform care-planning as well as risk-adjustment in value-based payments.

PURPOSE OF THIS PROJECT

To test and validate frailty algorithms to identify frailty or persons at risk of frailty using Medicare claims data, as well as assess opportunities for using EHR data.

METHODS

An expert panel of geriatric researchers, algorithm developers, and machine learning experts was convened to guide the project. Researchers from RAND first developed a claims-based frailty algorithm from candidate items, then validated it against post-acute care assessment data on mobility and cognitive function. The candidate algorithm was then compared with two existing claims-based frailty algorithms – one developed by researcher Keturah Faurot (2015), another by Dae Kim (2018).

KEY FINDINGS

The performance of the 3 claims-based frailty algorithms were similar, but the Claims-based Frailty Index (CFI) developed by Harvard researcher, Dae Kim performed the best at predicting near-term outcomes related to ADL dependencies, hospitalization, nursing home stays, and days at home among Medicare FFS beneficiaries.

RECOMMENDATION: Include the Claims-based Frailty Index (CFI) in the CMS Chronic Condition Warehouse (CCW).

The Claims Frailty Index by Kim et al. was initially developed using data from the *Medicare Current Beneficiary Survey* (MCBS), a nationally representative survey which includes claims data along with patient self-reported ADL dependencies, mobility disability and recurrent falls, and validated against the *Health and Retirement Study*.

CASE STUDIES

Through engagement of health systems and health care providers and an environmental scan, case studies were identified of how EHR data (including health assessment data) may be used to identify frailty or persons at risk of frailty.

1. Veterans Health Administration (VA) – Surgical Pause

VA’s “[Surgical Pause](#)” intervention screens surgery candidates for frailty to plan care or reconsider surgery. VA uses its EHR and health assessment data through its “*Care Assessment Need*” to identify patients at risk of hospitalization and death.

2. Primary Care Partners in Grand Junction, CO – Patient Pattern software

This primary care practice in collaboration with long-term care facilities uses EHR and nursing home assessment data with the software, [Patient Pattern](#) to identify patients at risk of frailty and provide care that is ‘Safe, Simple, and Respectful’.

3. Beth Israel Deaconess Medical Center – Frailty Index

At Beth Israel Deaconess Medical Center, EHR and physician assessment data are blended using a tool that generates a frailty score and estimate of biological age. It is used by geriatrics consultants for care of patients in the hospital and as part of the pre-operative process for older patients. An online version called [Senior Health Calculator](#) is also available.

4. National Health Service - electronic Frailty Index (NHS-eFI)

Doctors in England, UK use primary care electronic health record data to identify patients who are at risk of moderate to severe frailty for population risk stratification. The [electronic frailty index](#) aims to promote access to appropriate care across settings of care and overall wellbeing through reduced adverse outcomes. It has also been modified for use in a Medicare ACO in the US.

RECOMMENDATION: Findings from these case studies suggest **risk stratification approaches for population health management can incorporate claims or electronic health record frailty indices- CFI or EFI** to improve prediction of poor outcomes and identification of individuals at risk of frailty or who are frail.

CONSIDERATIONS: Use of EHR data to identify frailty should consider **data completeness and data quality.**

POTENTIAL APPLICATIONS

Validated claims/EHR-based frailty indices are currently being used by clinicians to inform individual care planning, guide surgical decisions (ACS) and by health systems to pro-actively identify at-risk patients for in-depth clinical screenings or comprehensive geriatric assessments (Cooper, 2022) for early interventions to reverse frailty and prevent falls, functional decline and poor outcomes. International clinical guidelines (Dent, 2019) recommend screening all older adults for frailty using a validated instrument and to perform an assessment for those who screen positive. Recommendations for the management of frail patients include addressing polypharmacy, management of sarcopenia, treatable causes of weight loss and exhaustion, physical activity program with resistance-based training. (Allison, 2021) Through the *Medicare Inpatient Quality Reporting Program*, hospitals also have the opportunity to identify frail patients by screening patients for delirium, cognition, mobility and function, social determinants and other risks.

CONCLUSION

Frailty indices can be a first step to help identify at-risk individuals of functional decline and adverse outcomes. ASPE will work with CMS to include the CFI in the CCW so that the claims-based frailty index is available to researchers, health systems and providers to identify, assess and target interventions to persons at risk for frailty.

Project Reports:

Reviewing, Refining, and Validating Claims-Based Algorithms of Frailty and Functional Impairment, RAND Corp under contract with ASPE, March 2023

Identifying Frailty Using Existing Health Data - Challenges and Opportunities for Health Systems, RAND Corp under contract with ASPE, September 2022

Developing and Assessing the Validity of Claims-based Indicators of Frailty & Functional Disabilities and Testing their Use in Other Data, Johns Hopkins University Center for Population Health IT under contract with AHRQ through ACTION IV network, September 2022 <https://www.ahrq.gov/sites/default/files/wysiwyg/learning-health-systems/frailty-ehr.pdf>

SQL and SAS code used for this project is available in [Github](#).

Publications:

Heins, S. E., Agniel, D., Mann, J., & Sorbero, M. E. (2023). Development and Validation of Algorithms to Predict Activity, Mobility, and Memory Limitations Using Medicare Claims and Post-Acute Care Assessments. *Journal of Applied Gerontology*, 42(7), 1651-1661. <https://doi.org/10.1177/07334648231162613>

Heins, S. E., Agniel, D., Mann, J., & Sorbero, M. E. (in press). Comparative Performance of Three Claims-Based Frailty Measures among Medicare Beneficiaries. *Journal of Applied Gerontology*.

References:

Allison, R., 2nd, Assadzandi, S., & Adelman, M. (2021). Frailty: Evaluation and Management. *American family physician*, 103(4), 219–226, <https://www.aafp.org/pubs/afp/issues/2021/0215/p219.html>

American College of Surgeons (ACS) Best Practice Guidelines, Optimal Pre-operative Assessment of the Pre-Surgical Geriatric Patient, https://www.facs.org/media/invehw0d/acsnsqipagsgeriatric2012guide_lines.pdf

American College of Surgeons (ACS) Best Practice Guidelines, Optimal Perioperative Management of the Geriatric Patient, <https://www.facs.org/media/y5efmgox/acs-nsqip-geriatric-2016-guidelines.pdf>

Cooper, L., Loewenthal, J., Frain, L. N., Tulebaev, S., Cardin, K., Hshieh, T. T., Dumontier, C., Streiter, S., Joseph, C., Hilt, A., Theou, O., Rockwood, K., Orkaby, A. R., & Javedan, H. (2022). From research to bedside: Incorporation of a CGA-based frailty index among multiple comanagement services. *Journal of the American Geriatrics Society*, 70(1), 90–98. <https://doi.org/10.1111/jgs.17446>

Dent, E., Morley, J.E., Cruz-Jentoft, A.J. *et al.* Physical Frailty: ICFSR International Clinical Practice Guidelines for Identification and Management. *J Nutr Health Aging* 23, 771–787 (2019). <https://doi.org/10.1007/s12603-019-1273-z>

Faurot, K. R., Jonsson Funk, M., Pate, V., Brookhart, M. A., Patrick, A., Hanson, L. C., Castillo, W. C., & Stürmer, T. (2015). Using claims data to predict dependency in activities of daily living as a proxy for frailty.

Pharmacoepidemiology and drug safety, 24(1), 59–66. <https://doi.org/10.1002/pds.3719>

Kim, D. H., Schneeweiss, S., Glynn, R. J., Lipsitz, L. A., Rockwood, K., & Avorn, J. (2018). Measuring Frailty in Medicare Data: Development and Validation of a Claims-Based Frailty Index. *The journals of gerontology. Series A, Biological sciences and medical sciences*, 73(7), 980–987. <https://doi.org/10.1093/gerona/glx229>

Kim, D. H., Glynn, R. J., Avorn, J., Lipsitz, L. A., Rockwood, K., Pawar, A., & Schneeweiss, S. (2019). Validation of a Claims-Based Frailty Index Against Physical Performance and Adverse Health Outcomes in the Health and Retirement Study. *The journals of gerontology. Series A, Biological sciences and medical sciences*, 74(8), 1271–1276. <https://doi.org/10.1093/gerona/gly197>

Kim, D. H., Paterno, E., Pawar, A., Lee, H., Schneeweiss, S., & Glynn, R. J. (2020). Measuring Frailty in Administrative Claims Data: Comparative Performance of Four Claims-Based Frailty Measures in the U.S. Medicare Data. *The journals of gerontology. Series A, Biological sciences and medical sciences*, 75(6), 1120–1125. <https://doi.org/10.1093/gerona/glz224>

Rockwood K, Mitnitski A. Frailty defined by deficit accumulation and geriatric medicine defined by frailty. *Clin Geriatr Med*. 2011;27(1):17–26. doi:10.1016/j.cger.2010.08.008

Resources:

- Dae Kim, Claims-based Frailty Index, programming codes <https://dataverse.harvard.edu/dataverse/cfi>
- Veterans Administration, Surgical Pause <https://marketplace.va.gov/innovations/preoperative-frailty-screening-prehabilitation> <https://www.hsrd.research.va.gov/impacts/surgical-pause.cfm>
- Patient Pattern, <https://patientpattern.com/>
- Primary Care Partners, <https://frailtyworkgroup.org/pcmh-interview-patrick-page-md/>
- Beth Israel Deaconess Medical Center, Senior Health Calculator Tool, <https://www.bidmc.org/research/research-by-department/medicine/gerontology/calculator>
- National Health Service, England, United Kingdom <https://www.england.nhs.uk/ourwork/clinical-policy/older-people/frailty/efi/>

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