Frailty Indices Using Claims Data: Examples from a Hospitalized Medicare Population

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Background

- Frailty is a clinical syndrome, often seen in the elderly, characterized by a reduction in physiological reserve and increased vulnerability to stressors. Frail patients have an increased risk for adverse health outcomes, including falls, hospitalization, disability, and mortality
- Frail patients are often excluded from clinical trials, creating significant evidence gaps that real-world data must help address. However, observational studies risk producing biased results unless robust methods are used to identify and adjust for frailty
- Multiple claims-based indices have been proposed to identify frailty

Objective

- Implement two published claims-based frailty algorithms in a hospitalized Medicare population and describe patient characteristics and outcomes by frailty status

Methods

- We identified all acute inpatient hospitalizations in the Medicare 5% Standard Analytic Files 2017-2022
- Patients were excluded if age or sex data was unavailable or if they had < 12 months of continuous Part A and B enrollment prior to admission
- We calculated frailty scores for each admission using the methods developed by Kim et al. and the adaptation of the Risk Analysis Index (RAI) for ICD-10-CM
- The **Kim Index** uses diagnosis codes, and CPT/HCPCS codes from the inpatient admission and preceding 365 days. Calculated score ranges from 0 to 1
- Patients were categorized as: Robust (< 0.15); Pre-Frail (0.15 to < 0.25); Mildly Frail (0.25 to < 0.35); or Moderately to Severely Frail (0.35 to 1.0)
- **RAI** uses age, sex, and diagnosis codes from the inpatient admission. Calculated score ranges from 0 to 81
- Patients were categorized as Robust (< 27); Normal (27 to < 36); Frail (36 to < 46); or Very Frail (46 to 81)
- For each index and frailty category demographic variables, Charlson Comorbidity Index (CCI), and outcomes associated with the inpatient admission were reported
- For patients discharged alive prior to December 2022, 30-day readmission and mortality were calculated

Results

Figure 1. Distribution of Frailty Status as Defined by **Kim** and **RAI**. N= 2,330,515 Acute Inpatient Hospitalizations, 2017-2022

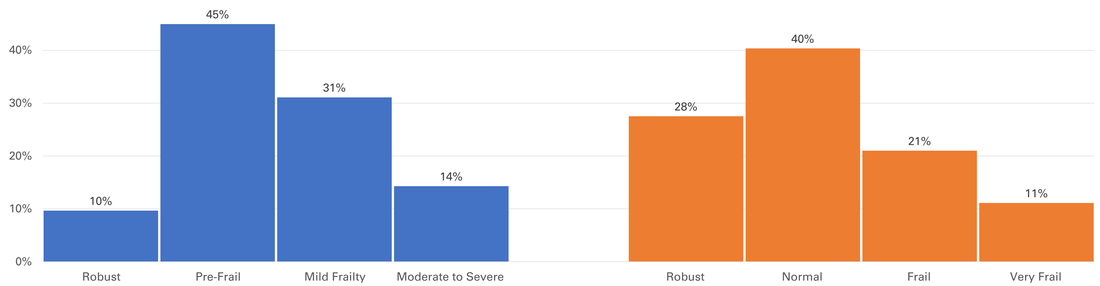


Table 1. Demographics and Charlson Comorbidity Index by Frailty Status as Defined by **Kim** and **RAI**

	Mean Age	Male Sex	Mean CCI
Robust	71	56.7%	1.5
Pre-Frail	73	48.7%	2.7
Mild Frailty	74	43.1%	4.4
Moderate to Severe	75	38.5%	5.9

	Mean Age	Male Sex	Mean CCI
Robust	60	38.1%	2.7
Normal	76	49.9%	3.3
Frail	81	43.6%	4.2
Very Frail	82	58.4%	5.7

Figure 2. Outcomes at Discharge by Frailty Status as Defined by **Kim** and **RAI**

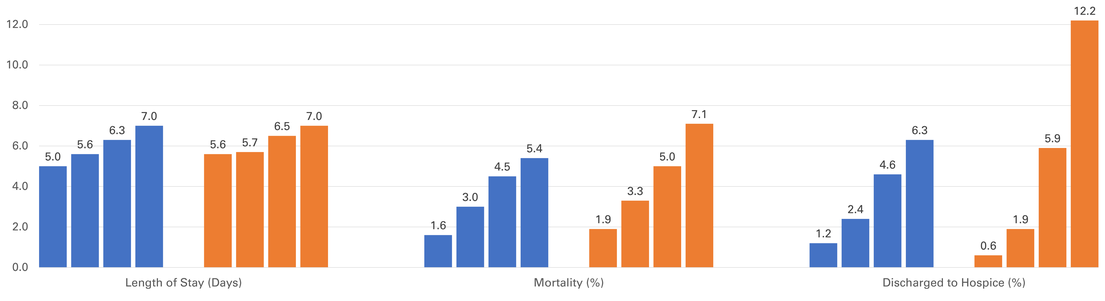
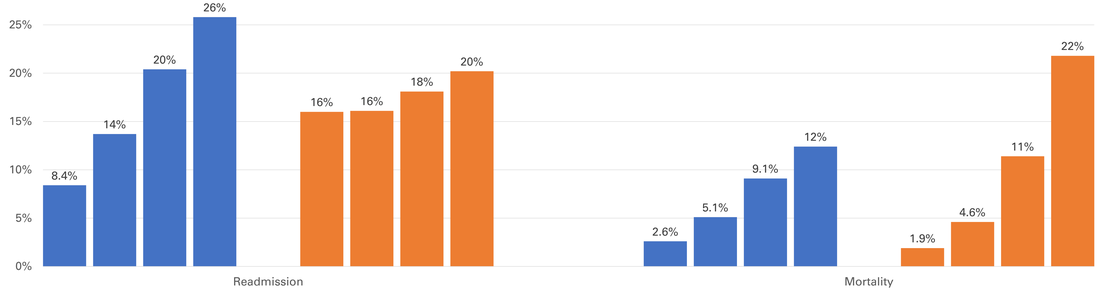


Figure 3. Outcomes 30-Days Post-Discharge by Frailty Status as Defined by **Kim** and **RAI**



Results

- Mean frailty score in the Kim index was 0.25, corresponding to the Mild Frailty category
- Mean frailty score in RAI was 32, corresponding to the Normal category
- The Kim index classified a greater proportion of patients as frail (45%) compared to RAI (32%). The largest difference was in the robust category (10% vs. 28%)
- In both indices, increasing frailty status was associated with increased age
- This difference was more pronounced in the RAI classification, with a mean age of 60 in the Robust category and 82 in the Very Frail category, whereas Kim ranged from 71 to 75
- As Kim-scored frailty increases, the proportion of male patients decreases. The opposite is seen in RAI, with the proportion of male patients increasing with increasing frailty
- In both indices. CCI, length of stay, in-hospital mortality, discharge to hospice, 30-day readmission, and 30-day mortality all increase with more severe frailty

Conclusions

- Kim and RAI identify different populations of frail patients
- In both indices, a more severe frailty status is associated with worse outcomes
- Further research is needed to understand patients with discordant frailty status across each index
- Choice of frailty index for any particular study may depend on the study population and research question

References

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