Associations between routine blood tests and medication use with adverse clinical outcomes in acutely admitted medical patients

Background: Initiating medication review is typically based on age and number of medications, overlooking disease burden. Its impact on readmission and mortality is inconsistent, challenging current patient stratification methods. The "frailty index out of reference range" (FI-OutRef), derived from abnormal biomarkers in routine admission blood tests, offers a new measure of disease burden that may be valuable for this purpose.

Objective: To investigate the association between medications and FI-OutRef with adverse clinical outcomes in acutely admitted medical patients, to evaluate the utility of FI-OutRef in patient stratification for medication review.

Table 1. Association between FI-OutRef and risks of 90-day readmission and mortality within each medication level

Medications	FI-OutRef	HR (95% CI)	P-value
Readmission			
0	≤4	1.00	
	5-7	2.13 (1.83-2.48)	<.001
	≥8	2.75 (2.22-3.41)	<.001
1	≤4	1.00	
	5-7	1.70 (1.42-2.03)	<.001
	≥8	2.77 (2.18-3.53)	<.001
2-4	≤4	1.00	
	5-7	1.59 (1.44-1.75)	<.001
	≥8	2.12 (1.85-2-43)	<.001
5-9	≤4	1.00	
	5-7	1.42 (1.30-1.55)	<.001
	≥8	1.94 (1.75-2.16)	<.001
≥10	≤4	1.00	
	5-7	1.36 (1.22-1.52)	<.001
	≥8	1.72 (1.53-1.93)	<.001
Mortality			
0	≤4	1.00	
	5-7	4.30 (2.06-8.90)	<.001
	≥8	8.82 (4.22-18.4)	<.001
1	≤4	1.00	
	5-7	4.39 (2.13-9.00)	<.001
	≥8	5.50 (2.42-12.5)	<.001
2-4	≤4	1.00	
	5-7	4.81 (3.35-6.90)	<.001
	≥8	8.67 (5.91-12.7)	<.001
5-9	≤4	1.00	
	5-7	3.26 (2.49-4.25)	<.001
	≥8	7.37 (5.65-9.61)	<.001
≥10	≤4	1.00	
	5-7	2.65 (2.02-3.47)	<.001
	≥8	4.61 (3.52-6.02)	<.001

Abbreviations: CI: confidence interval, FI-OutRef: frailty index out of reference range, HR: hazard ratio, n: number of patients.

Findings: Patients with increasing FI-OutRef were generally more morbid compared to those with FI-OutRef ≤4. Across all medication levels, increasing FI-OutRef was significantly associated with increasing risks of readmission and mortality (Table 1). This indicates that FI-OutRef contributes to the association between medications and adverse clinical outcomes and could potentially improve patient stratification for medication review. However, further studies are needed to further explore these associations and to establish clinically relevant cutoffs.

Methods:

This study analyzed 27,873 acutely admitted medical patients (≥18 years) in the emergency department with routine admission blood tests taken. Patients were grouped by medications and FI-OutRef and followed for 90-day readmission or mortality. Cox regression assessed the interaction term between medications and FI-OutRef with outcomes, using FI-OutRef ≤4 as the reference for all medication levels.

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