Impact of Medication Clusters on Post-Discharge Adverse Drug Events and Healthcare Utilization Among Older Adults

EPH178

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Introduction

- Medications at hospital discharge may substantially influence post-discharge adverse drug events (ADEs) and healthcare utilization (HCU) among older adults.[1,2,3]
- Post-discharge ADEs affect 17–51% of older adults within 30 days, with 35–59% of these events deemed preventable.[1,2]
- Polypharmacy at discharge is independently associated with increased hospitalization and mortality in older adults.[3]
- Single drug safety indicators do not account for the combined effects of medication clusters on post-discharge outcomes.

Objective

To characterize discharge medication clusters and assess their associations with 30-day ADEs and HCU using electronic health records (EHR) from a regional medical center.

Methods

Study design & data

- Retrospective EHR analysis (2020–2024)
- Data source: Buffalo General Medical Center (Kaleida Health)
- Population: Adults aged ≥65 years with ≥1 hospitalization.
- The index admission was the first hospitalization with ≥1 discharge medication and ≥183 days of prior EHR history.

Outcomes and follow-up

- Individuals were followed up for 30 days after discharge from the index hospitalization for the outcomes below:

HCU	Emergency department (ED) visits
	Readmissions
	Composite HCU (ED visits or readmission)
ADE	Captured by ICD-10 codes based on the Hohl's list[4]

Analysis

Steps		Descriptions
Data harmonization		Mapping medication records to Anatomical Therapeutic Chemical (ATC) codes [Supplement]
Cluster analysis	Method	Latent class analysis (LCA) → Level 2 ATC with inclusion threshold at 2.5%.
	Cluster selection	The Bayesian information criterion and entropy-guided selection.
Labeling		Clusters were labeled (named) based on ATC composition following the study team's review.
Model construction		Multivariable logistic regression, adjusted for demographics, previous HCU, and comorbidities.
		Estimated odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using SAS 9.4.

Results

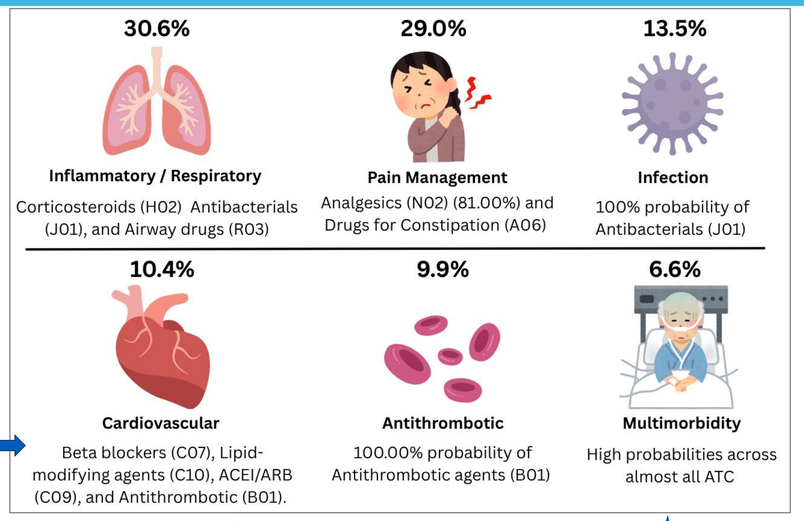
Table 1: Baseline characteristics (N=29,123)

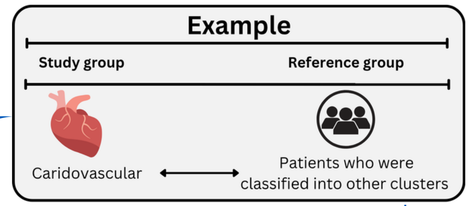
Age, Mean (SD)		78.2 (7.5)
Age group (%)	65-74	37.1%
	75-85	78.7%
	≥85	22.0%
Sex, Male (%)		44.9%
Race (%)	White	85.3%
	Black	8.8%
	Other	5.9%

Data harmonization → 19 unique level 2 ATC categories (>2.5%)

Cluster analysis: LCA: 6-8 classes + Highest entropy at 6

Labeling





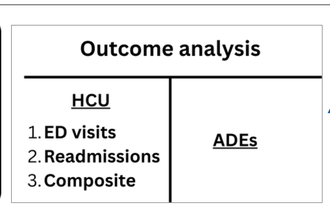


Figure 1: Medication clusters and 30-day ED visits

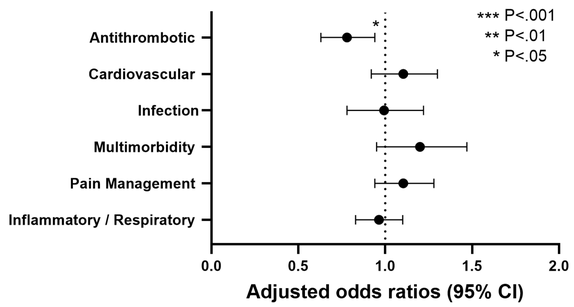


Figure 2: Medication clusters and 30-day readmissions

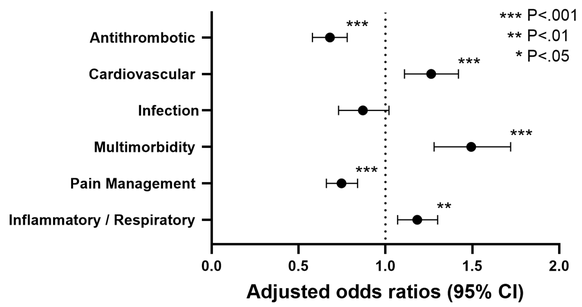


Figure 3: Medication clusters and 30-day composite HCU

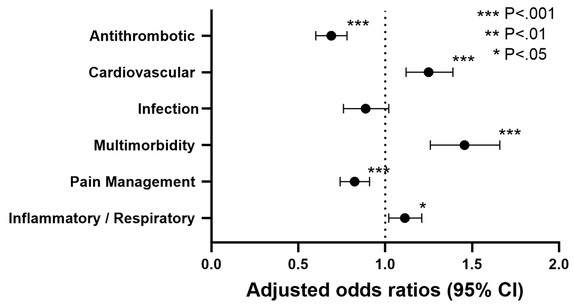
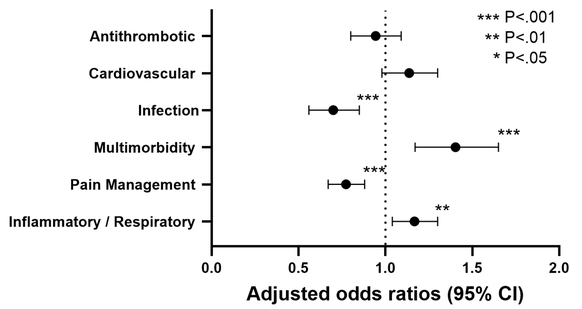


Figure 4: Medication clusters 30-day ADEs



Discussion

- This classification approach combined concepts from commonly adopted clinical flags (e.g., poly/hyperpolypharmacy and the Charlson Comorbidity Index) to assess risk.
- The "multimorbidity" cluster is the high-risk phenotype, suggesting that it isn't just the number of drugs, but the breadth of therapeutic categories involved that creates the highest risk for post-discharge complications.
- The antithrombotic cluster indicated reduced 30-day readmission and ADEs. This highlights that not all "high-risk" medication classes lead to higher acute HCU, possibly due to well-established awareness and monitoring practice.

Limitations:

- Data collection was restricted to a single institution, which may hinder the generalizability of our findings.
- ADEs were ascertained using ICD-10 codes, which may underestimate the true incidence of post-discharge ADEs.
- The observational design precluded causal inference; residual confounding could not be excluded.
- Clusters were probabilistically based on discharge medications captured at a single time point and did not account for post-discharge medication changes.

Future direction:

- The digital architecture of ICD-11 facilitates the systematic linkage of diagnoses to associated medications, offering a level of granularity that mirrors the cluster-based methodology employed in this study.

Conclusion

Distinct discharge medication clusters were differentially associated with 30-day HCU and ADEs. This identifies opportunities for tailored interventions targeting specific medication profiles to reduce preventable adverse outcomes among older adults during care transitions.

References

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3. Boateng et al. PLoS One. 2025;20(2):e0317907.
4. Hohl et al. Journal of the American Medical Informatics Association: JAMIA, 21(3), 547–557.

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Supplements