

Using Latent Class Analysis to Identify Differences in Clinical Presentation, Functional Status, and Healthcare Service Use

Abdi Deressa, M.D.¹, Ashraf Sliem, M.D.¹, Andrew Miele, M.A.², Alexandra Spinelli, B.A.³, Margaret McDonald, B.A.³, R. Jonathan Robitsek, Ph.D.², Robert I. Mendelson, M.D.⁴, Kelly L. Cervellione, MPhil.²

¹Flushing Hospital Medical Center, Queens, NY; ²Medisys Health Network, Melville, NY; ³St John's University, Queens, NY; ⁴Jamaica Hospital Medical Center, Queens, NY

Background

Reducing readmission rates can improve quality of patient care and reduce hospital costs¹. Although nonclinical factors often impact rates of healthcare service use, their inclusion in models predicting readmission is limited².

Latent class analysis (LCA) is a method used for constructing profiles of individuals based on sets of indicator variables³.

Aim

Our primary aim was to derive profiles of patients at risk for readmission using LCA that can be utilized to predict meaningful differences in clinical presentation, functional status, and future service use.

Methodology

Patients ($n=10,399$) presenting from 2017-2021 to hospitals within an urban healthcare network with conditions identified as high-risk for readmission (AMI, COPD, HF, pneumonia; CMS, 2018) were included.

LCA was conducted using patient sociodemographic characteristics.

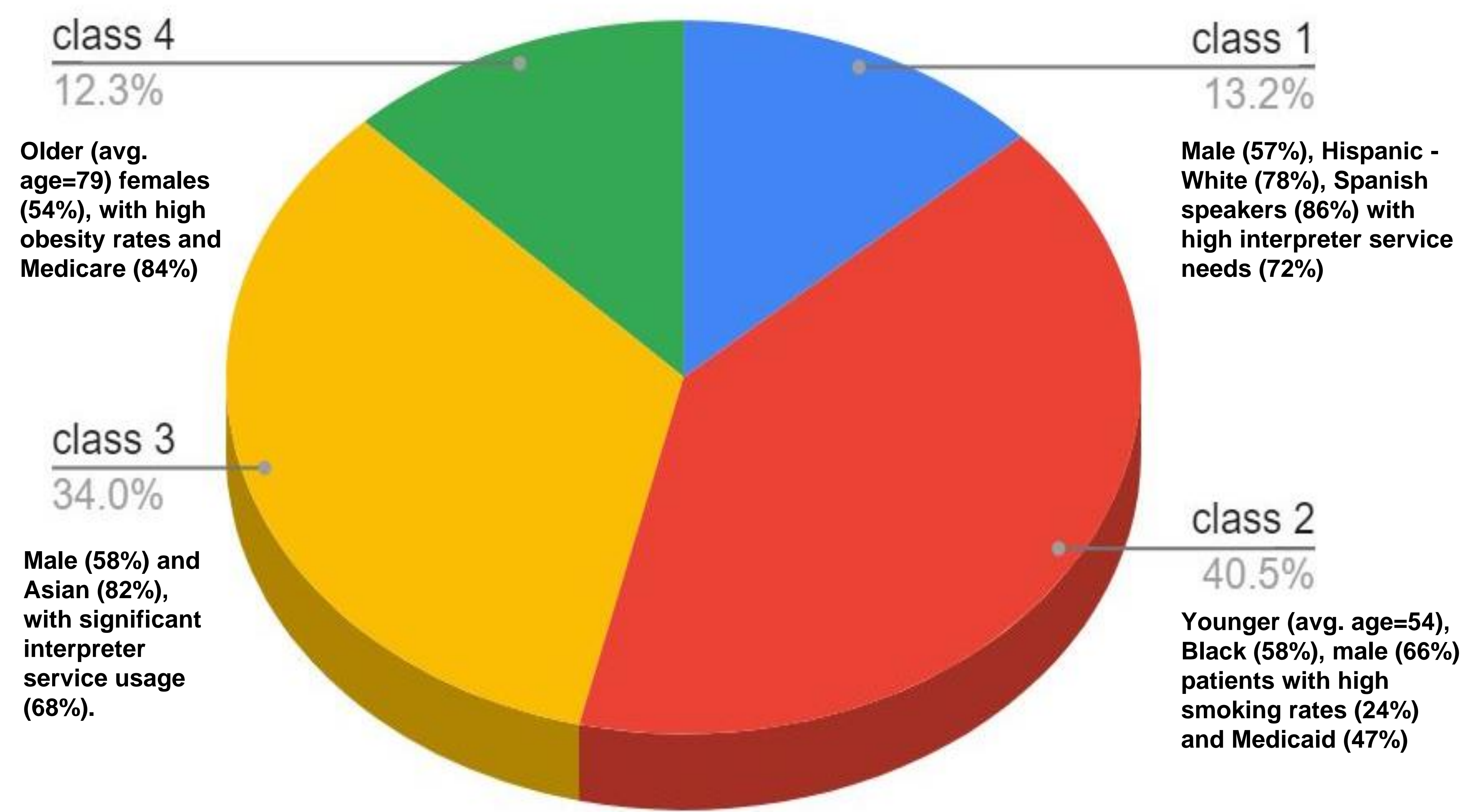
LCA profiles were then used as predictors of clinical presentation (e.g., AMI, COPD, HF), discharge functional status, and readmission.

Discharge functional status was operationalized as poor (e.g., discharged to SNF/LTC), intermediate (e.g., home health aide), leaving against medical advice (AMA), and no impairments (discharged home).

Key Points

- Latent class analysis identified a 4-class solution
- Subgroups (i.e., classes) differentiated by both sociodemographic and clinical need factors

Figure 1. Patient Profiles and descriptions identified by LCA



Clinical Implications

- Analysis of socioeconomic and demographic factors of patient populations can provide strong insights into patterns influencing increased hospital readmission.
- LCA is a novel method for identifying these patterns.
- Further study may focus on developing tailored interventions for reducing hospital readmissions related to certain diagnoses.

Results

Clinical Presentation

- Logistic regression showed class 3 had significantly higher likelihood of COPD (OR=1.4, 95% CI=[1.1-1.8], $p=0.01$) or HF (OR=1.8, CI=[1.5-2.2], $p<0.001$) as reason for index admission.
- Classes 1 (OR=1.8, CI=[1.5-2.1], $p<0.001$) and 4 (OR=1.8, CI=[1.5-2.1], $p<0.001$) were each more likely to have an index admission for pneumonia.

Discharge Functional Status

- Chi-square tests identified significant differences in discharge status at index admission ($\chi^2_{(9)}=725.9$, $p<0.001$).

Post-hoc tests showed:

- Class 2 more likely to leave AMA ($p<0.001$)
- Classes 3 & 4 more likely to have intermediate functional discharge status (p 's<0.0001)
- Class 4 more likely to have poor discharge status ($p<0.0001$), including in-hospital mortality ($p<0.0001$).

30-day Readmission

- Logistic regression showed classes 3 (OR=1.8, CI=[1.5-2.0], $p<0.001$) and 4 (OR=1.3, CI=[1.1-1.6], $p=0.02$) were each more likely to return within 30 days with an all-cause readmission, compared to other classes.

Conclusions

- 1) Our study identified four clinically meaningful subgroups among patients presenting for conditions with high readmission rates, each characterized by unique combinations of socioeconomic and demographic risk factors.
- 2) Class membership significantly predicted functional status at discharge and readmission.
- 3) Variables identified as important indicators requiring future research included older age, functional status, and need for language interpreters.

References

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