



# Quantifying and Understanding Adherence to Recommended Care Practices

Yuchen Zheng<sup>1</sup>, Ross Hilton<sup>1</sup>, Nicoleta Serban<sup>1</sup>, Ph.D., Anne Fitzpatrick<sup>2</sup>, Ph.D. RN, CPNP, MSCR, James Bost<sup>3</sup>, Ph.D.

<sup>1</sup>Georgia Institute of Technology, Atlanta, GA; <sup>2</sup>Emory University, Atlanta, GA

<sup>3</sup>Children's Healthcare of Atlanta, Atlanta, GA



## BACKGROUND

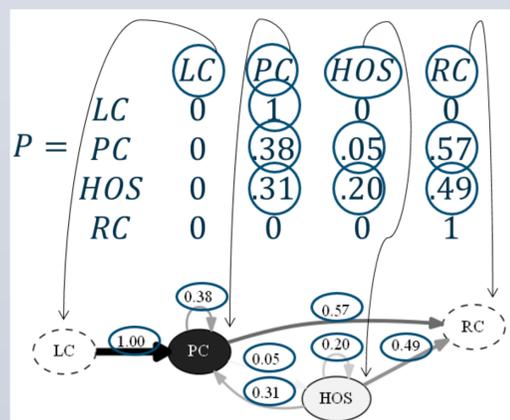
Asthma is the most common respiratory chronic disease in children. While it cannot be cured, with the appropriate medication and treatment plan, its symptoms can be controlled. Although there is strong evidence that adherence to recommended care practices for management can considerably improve outcomes, dissemination and implementation of these are still major challenges, particularly prevalent for the disadvantaged populations such as Medicaid-insured children.



## OBJECTIVES

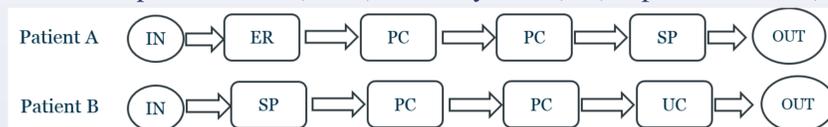
To quantify and understand adherence to basic recommended care for pediatric asthma in the Medicaid system:

- Uncover healthcare utilization profiles for pediatric asthma patients
- Study the transitions among provider types
- Derive inferences on recommended care practices
- Discover major catalysts of change of utilization
- Compare results between Georgia (GA) and North Carolina (NC)



## METHODS

- Model-Based Sequential Clustering with Expectation Maximization (EM) Algorithm
  - Realization of patients' utilization of care chronically from CMS Medicaid Analytical Extract (MAX): claims data and National Provider Identifier (NPI) data in 2009 for GA and NC
  - Categorization of provider types into Clinics (CL), Emergency department (ED), Hospitalizations (HOS), Mid-level practitioners (MLP), Primary care (PC), Specialist care (SP), Urgent care (UC).

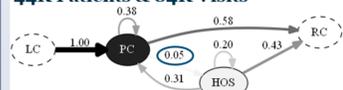


- Patient-Level Multinomial Logistic Regression
  - Link patients' choice of utilization with covariates such as geographic healthcare access
  - Stratified sub-sampling to alleviate inflated p-values due to large sample size

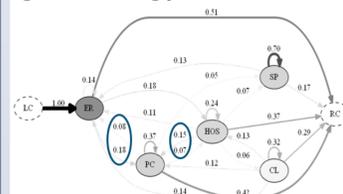
## RESULTS

### Utilization Pathways in Georgia

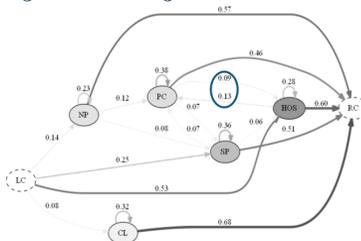
Summary of PC-Profile: 44K Patients & 84K Visits



Summary of ER-Profile: 13K Patients & 34K Visits

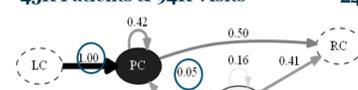


Summary of MP-Profile: 30K Patients & 58K Visits

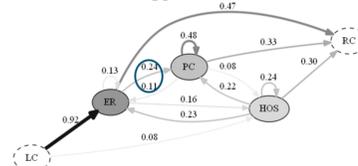


### Utilization Pathways in North Carolina

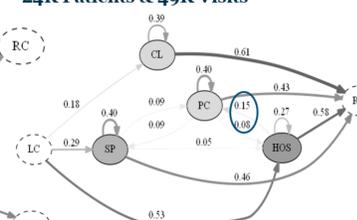
Summary of PC-Profile: 45K Patients & 94K Visits



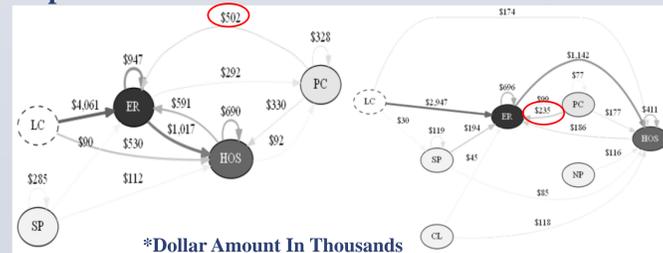
Summary of ER-Profile: 12K Patients & 35K Visits



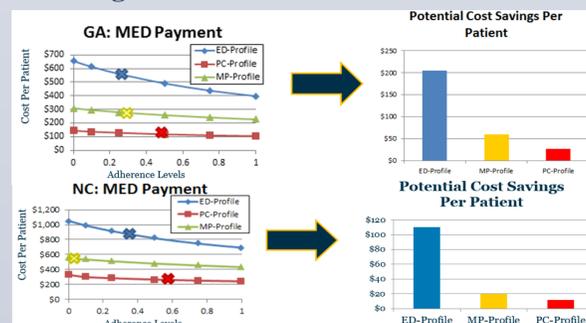
Summary of MP-Profile: 24K Patients & 49K Visits



### Expenditure Networks for ER-Profile in GA and NC



### Cost-savings for Recommended Care Interventions



### Result for Multinomial Logistic Regression

Category	Covariates	ER - PC Model Significance		MP - PC Model Significance	
		Statistical	Practical	Statistical	Practical
Personal Information	Age	NO	NO	YES	+ MINOR
	Race	YES*	- MINOR**	YES	- MINOR
	Gender	NO	NO	NO	NO
	FeeForService	NO	NO	NO	NO
	numClaims	YES	+ MINOR	YES	- MINOR
Risk Group	Minor	YES	- MINOR	NO	NO
	Chronic	NO	NO	NO	NO
	Severe	NO	- MINOR	NO	NO
Reason of Medicaid Enrollment	Blind/Disabled	YES-GA NO-NC	- MINOR	NO	NO
	Foster	YES-GA NO-NC	- MINOR	NO	NO
Zip code level	Distance to PC	YES	- MAJOR***	NO	NO
	Distance to SP	YES	- MAJOR	YES	- MAJOR
	Distance to ER	NO	- MAJOR	NO	MINOR
	Income	YES	- MAJOR	NO	NO
	Education	YES	+ MAJOR	YES	- MAJOR

\* P-value < 0.05 infers statistical significance;  
 \*\* Coefficient between 0.3 and 1 infers minor practical significance;  
 - An increase of covariate will result in higher probability in choosing PC over ER/MP;  
 + An increase of covariate will result in higher probability in choosing ER/MP over PC;

## FINDINGS

- Identified three profiles based on prevalence
- More than half of the patients seek care from PC providers
- ED/HOS visits are extremely costly for all profiles
- Patient-level covariates either insignificant or have weak practical significance
- PC and SP travel time greatly affect patients' choice between ER and PC-profile. Better PC and SP access will result in more PC-profile utilization.
- SP access have a major effect between ER and MP-profile

## CONCLUSIONS

We introduced a novel way of uncovering underlying utilization profiles in the system from patient-level claims data and find important implications for care providers and policy makers :

- More similarities than dissimilarities in pediatric asthma healthcare utilization between GA and NC
- Targeting communities and not individuals for interventions will have a higher impact in improving adherence to recommended care
- Levels of adherence to care protocols should be focused on patients who utilize emergency department as common source of care

## REFERENCES

Y.R. Zheng, R. Hilton, N. Serban, A. Fitzpatrick, J. Bost, "Quantifying and Understanding Adherence to Recommended Care Practices for Pediatric Asthma Care" *The Journal of Allergy and Clinical Immunology: In Practice*: Under Review

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## CONTACT

Yuchen Zheng: richardzyc@gatech.edu

Ross Hilton: rhilton3@gatech.edu

Nicoleta Serban: nserban@gatech.edu