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Implementation of antiretroviral therapy improved between 2001 and 2010 in the US

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Study background

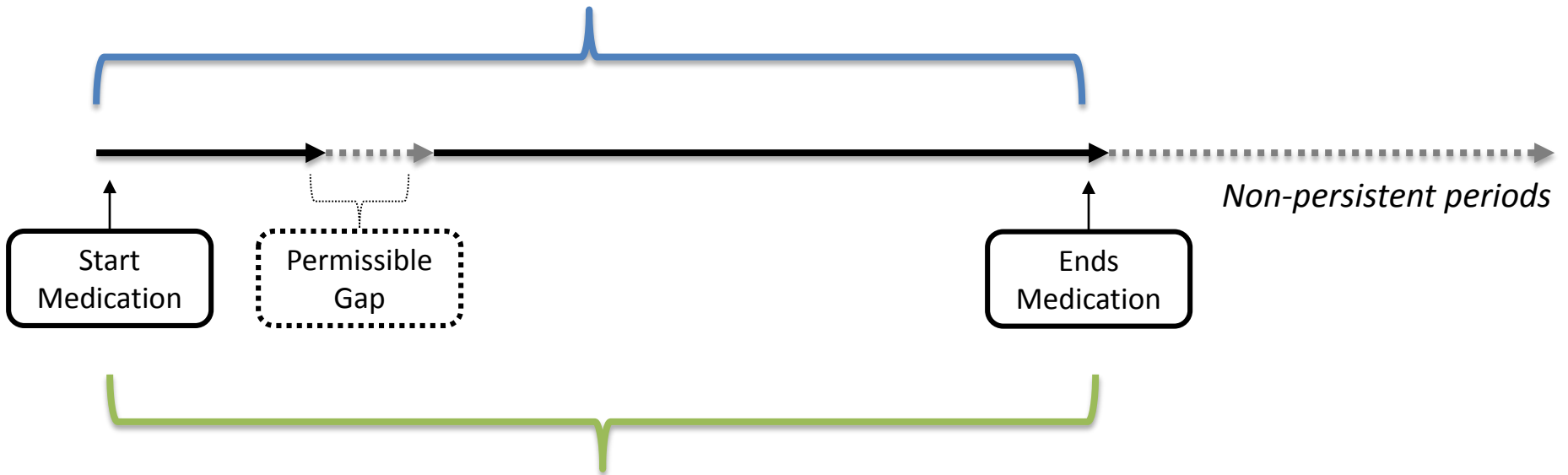
- Complete implementation of anti-retroviral therapy (ART) is a critical component of the Care Continuum
- Improved ART adherence in some individual HIV clinics and academic-based cohorts
- Limited nationally representative data on time trends or sociodemographic predictors
- Generalizable estimates can help identify areas for targeted interventions

Objectives

- (1) To examine the changes in ART implementation in a representative U.S population with Medicaid between 2001 and 2010
- (2) To determine the factors associated with ART implementation in a real-world setting

Persistence vs. Implementation

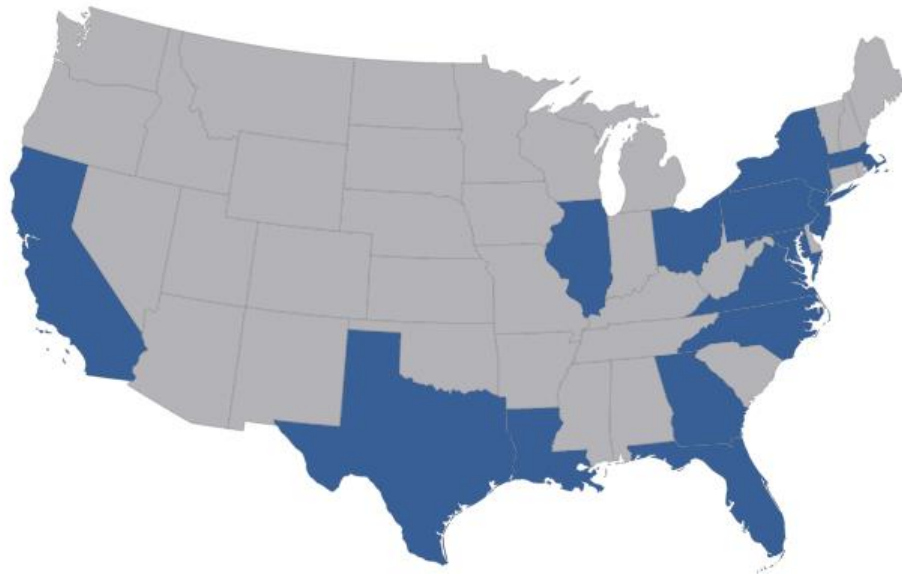
PERSISTENCE: duration of use without exceeding the permissible gap



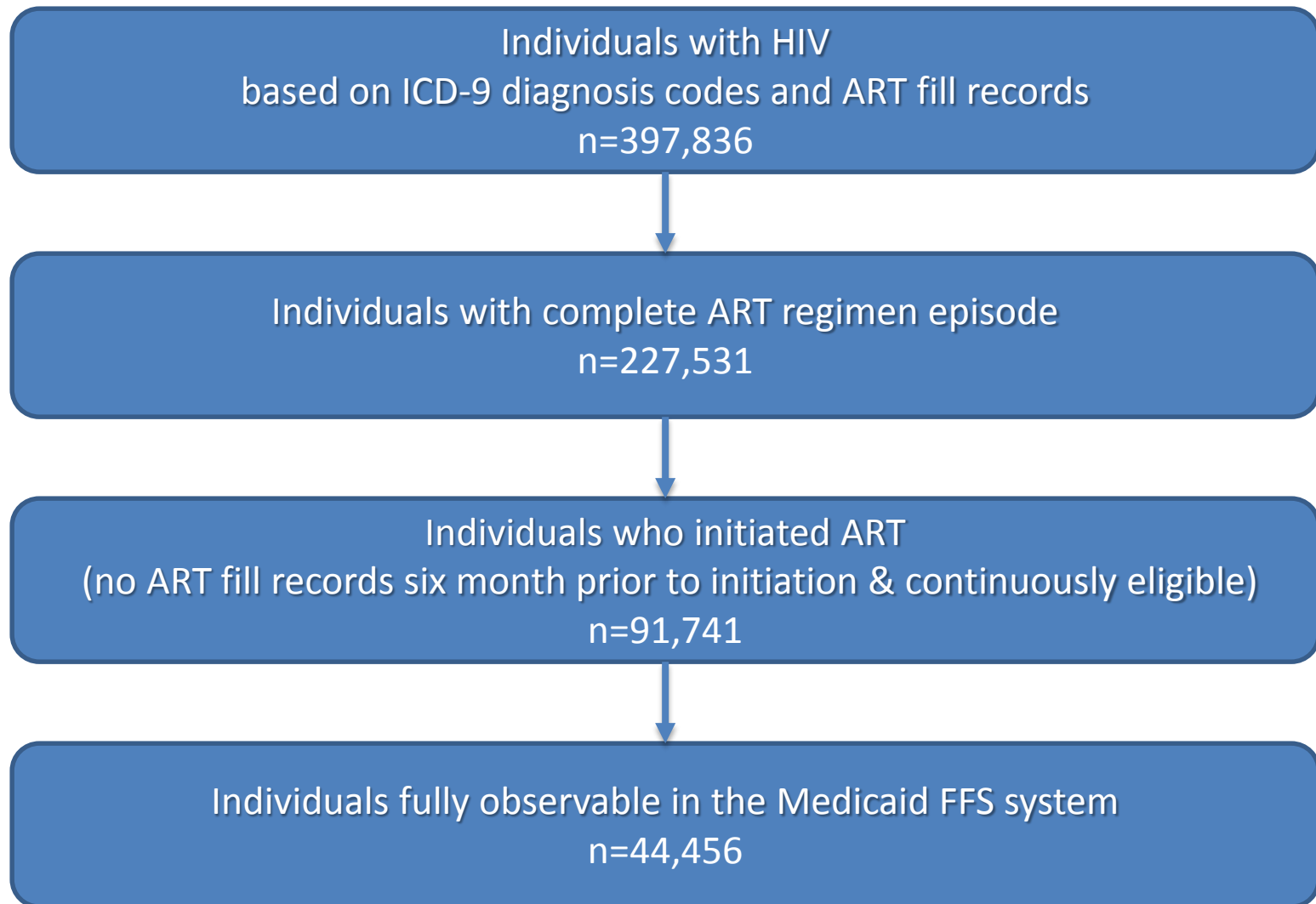
IMPLEMENTATION: % of doses taken as prescribed during the corresponding period of persistence

Data

- Medicaid Analytic Extract (MAX) file, 2001-2010
- Medicaid is the single largest source of care for HIV patients
- 14 states with the highest HIV prevalence (75% of US cases)



Study Inclusion Criteria



Outcome Measurement

- Month-level implementation rate:
number of days of medication supplied for each calendar month / number of days in each month during the corresponding period of persistence.
- n=808,682 months of observations from 44,456 patients (unit of analysis)
- Dichotomized monthly implementation rate for adjusted model: $\geq 90\%$ vs. $< 90\%$

Study Variables

Main Independent Variable

- Calendar year of treatment (2001-2003, 2004-2006, 2007-2010)

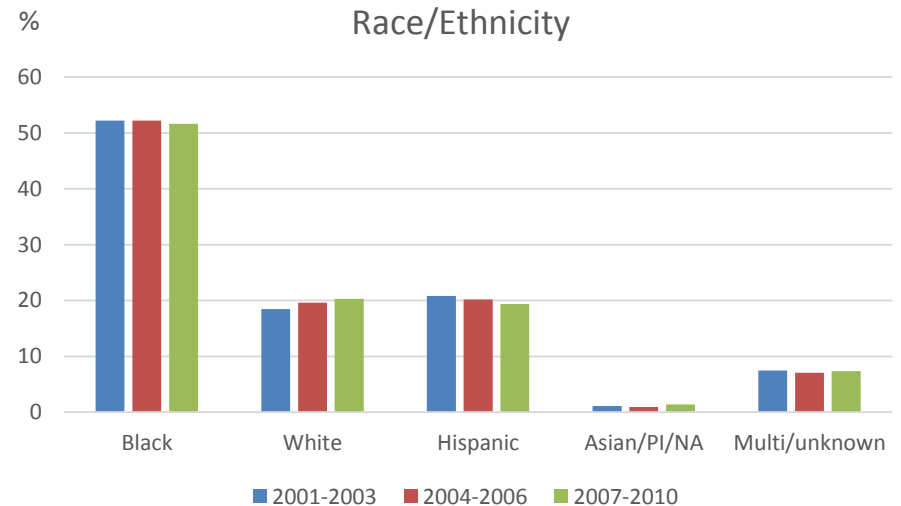
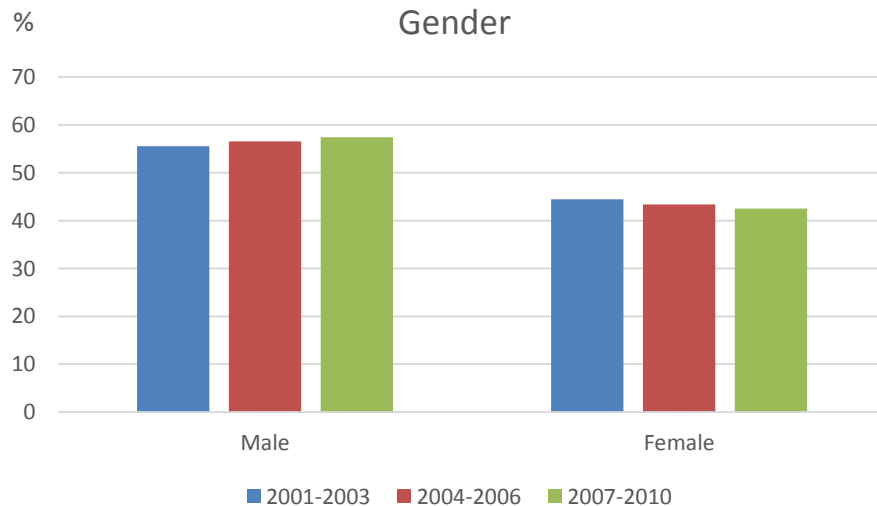
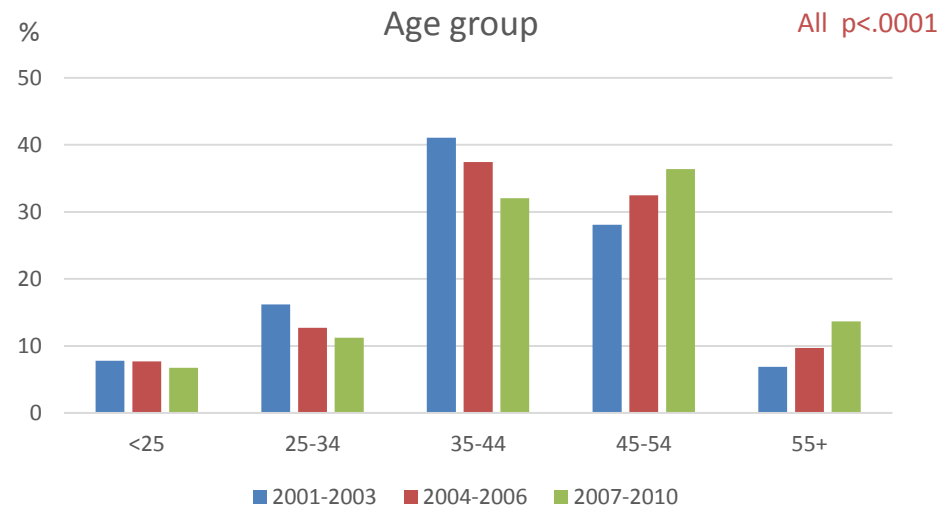
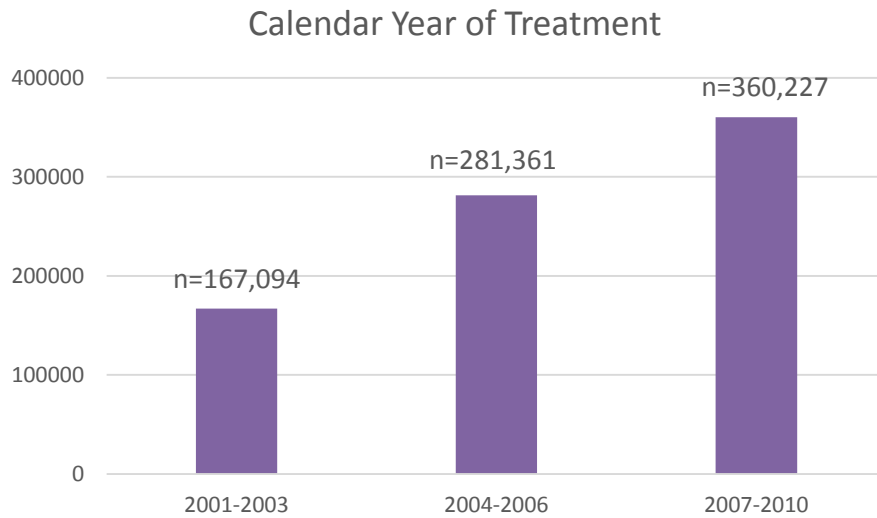
Covariates

- Age group
- Gender
- Race/Ethnicity
- State
- Initial ART regimen type (integrase inhibitor based, NRTI based, NNRTI based, PI based, multiple classes)
- Initial NRTI backbone (TDF/ABC, AZT, ddl/d4T, others)
- Single tablet regimen use

Statistical Analysis

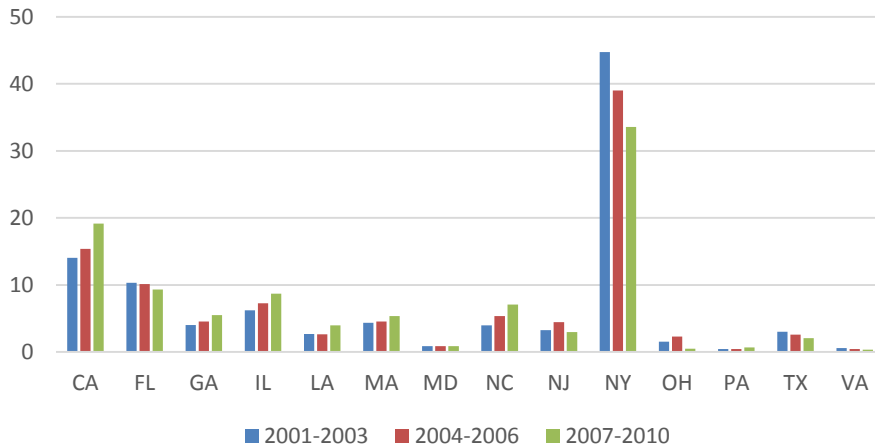
- Population-level monthly implementation rates obtained by averaging the rates across all persistent patients
- Generalized estimating equations (GEE) model with autoregressive correlation used to evaluate the factors associated with complete implementation, adjusting for covariates
- Sensitivity Analysis: 80% and 95% cutoff, exchangeable correlation, and logistic regression model.

Descriptive Statistics



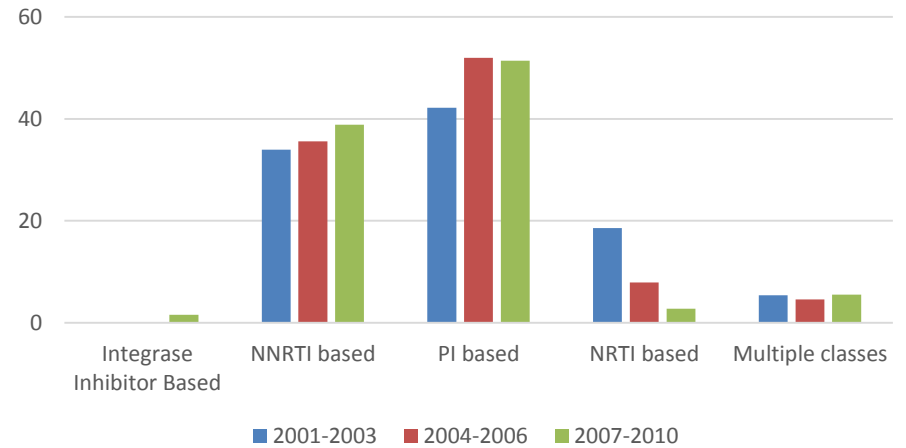
Descriptive Statistics

State

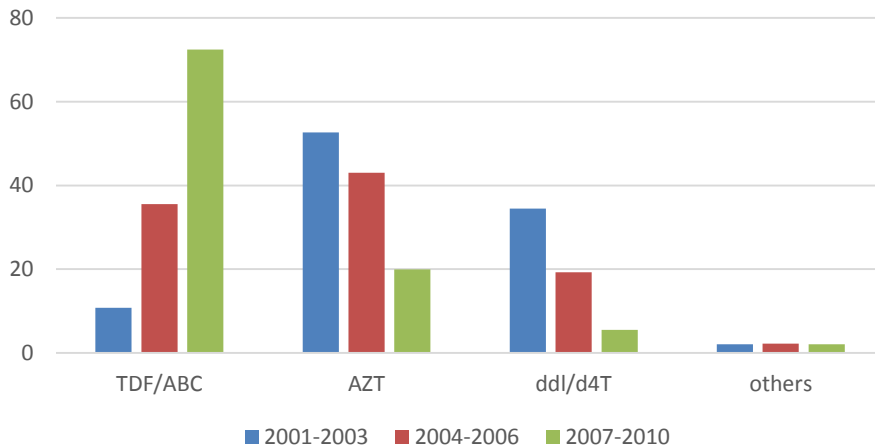


Regimen type

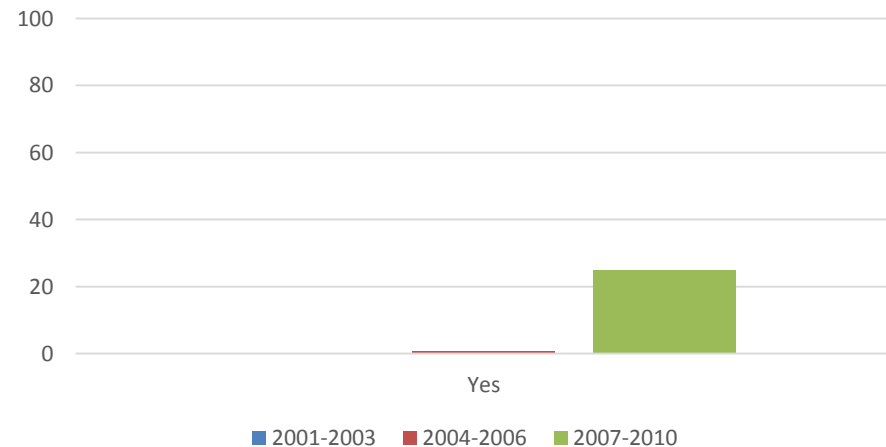
All $p < .0001$



NRTI backbone

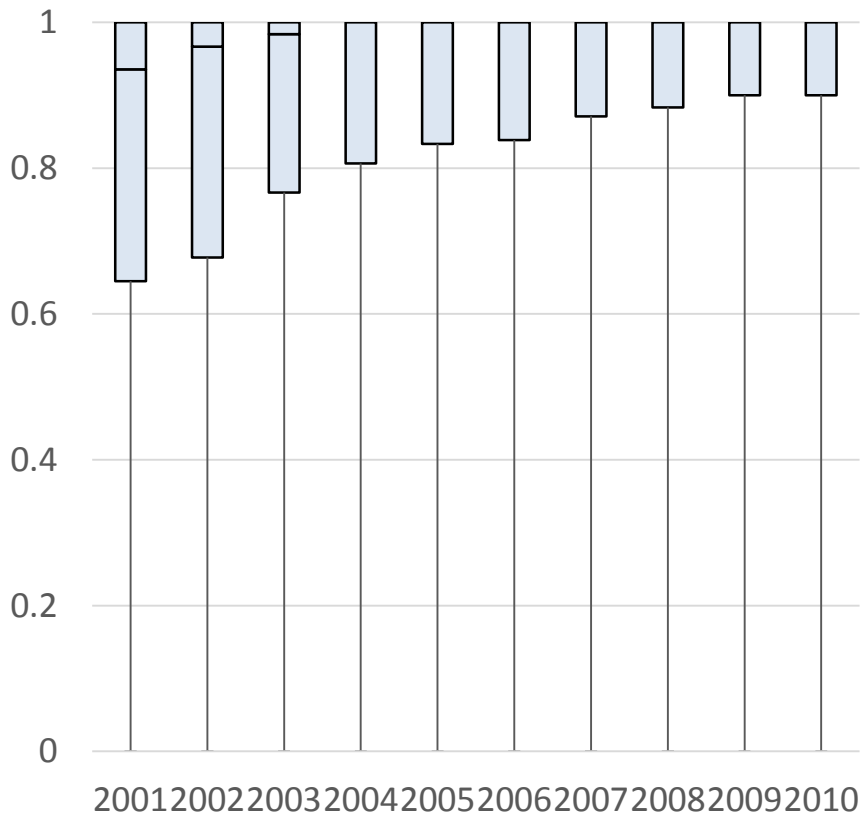


Single Tablet Regimen Use

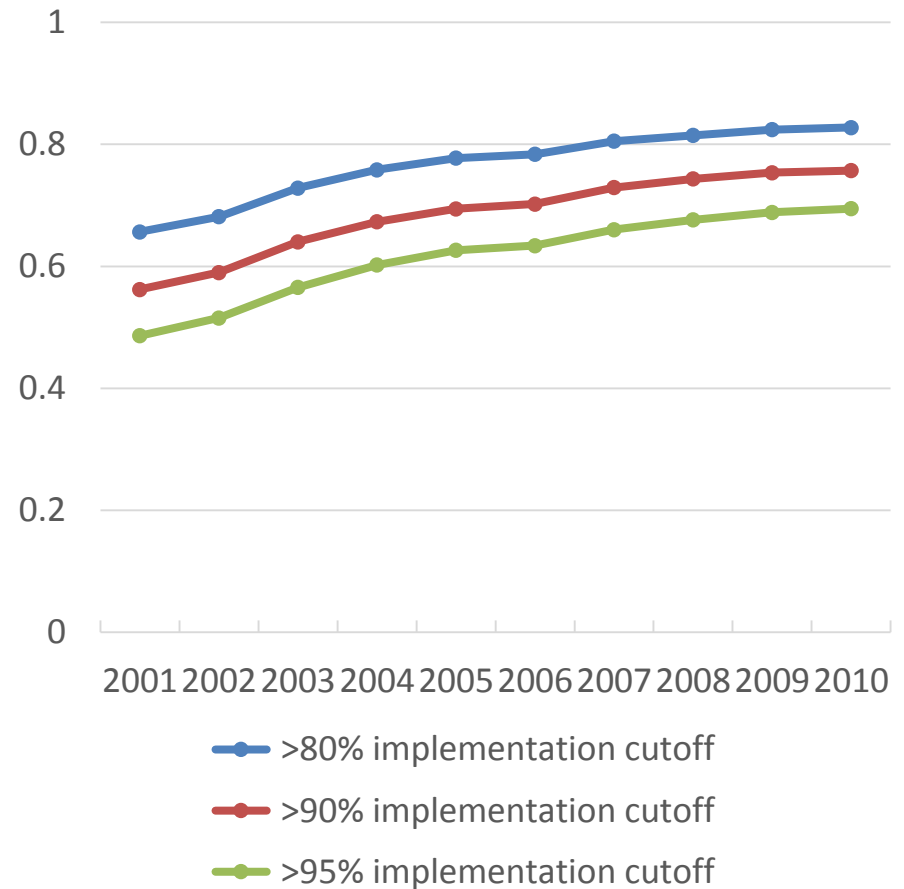


Monthly Implementation Rate by Calendar Year (unadjusted)

Distribution of monthly implementation rate

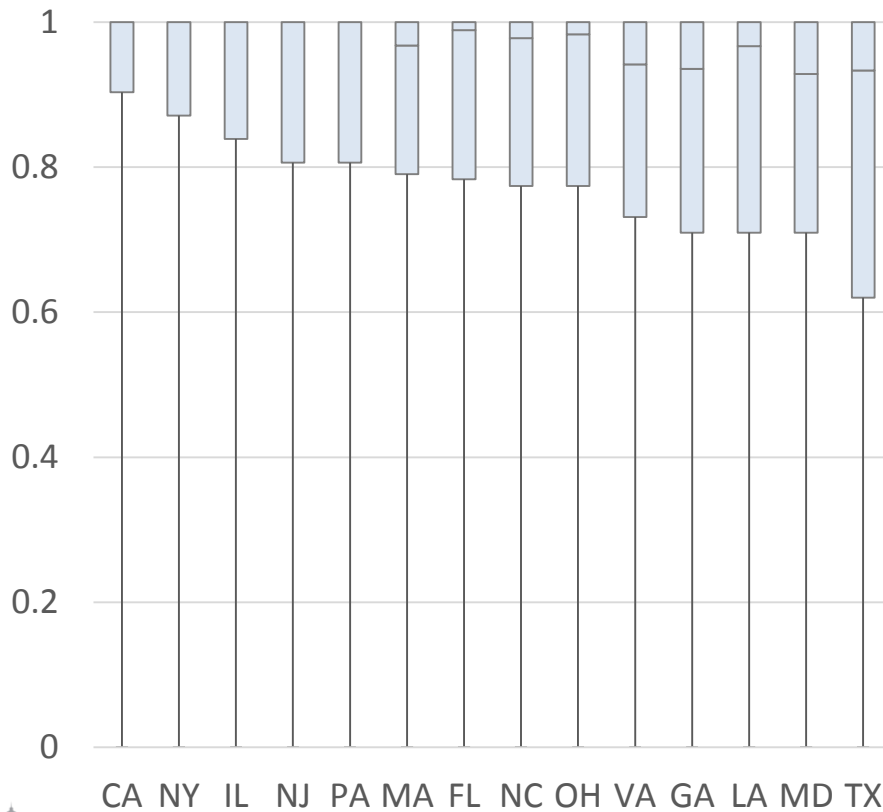


Proportion of months with complete implementation

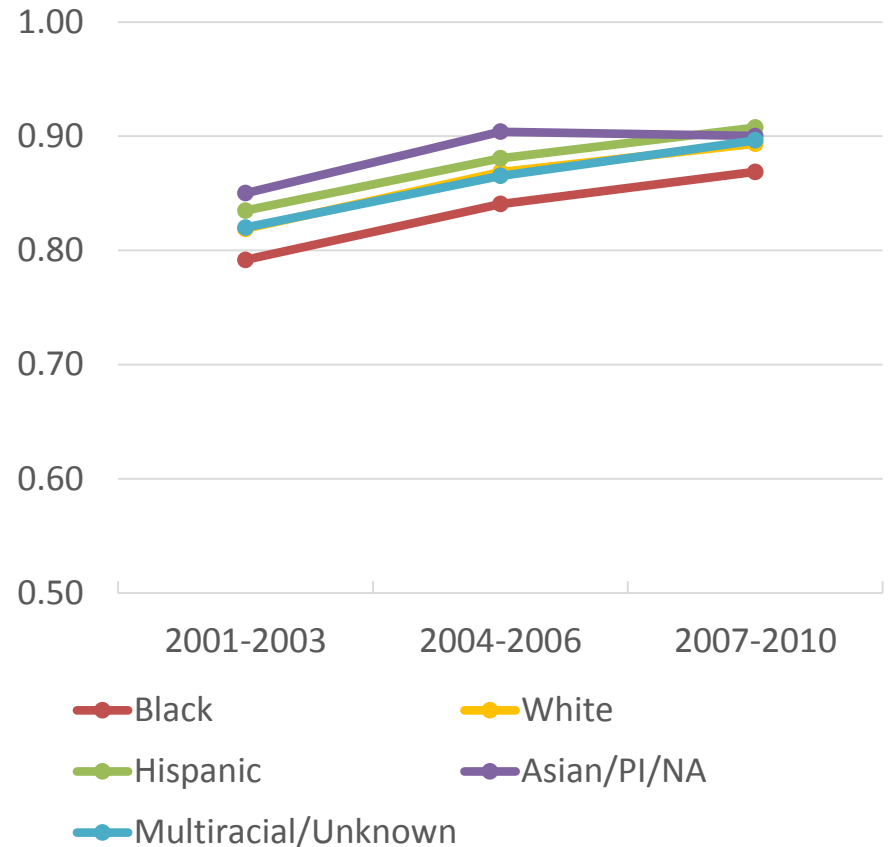


Monthly Implementation Rate by State and Race/Ethnicity

Distribution of monthly implementation rate by State



Mean monthly implementation rate by race/ethnicity and calendar year



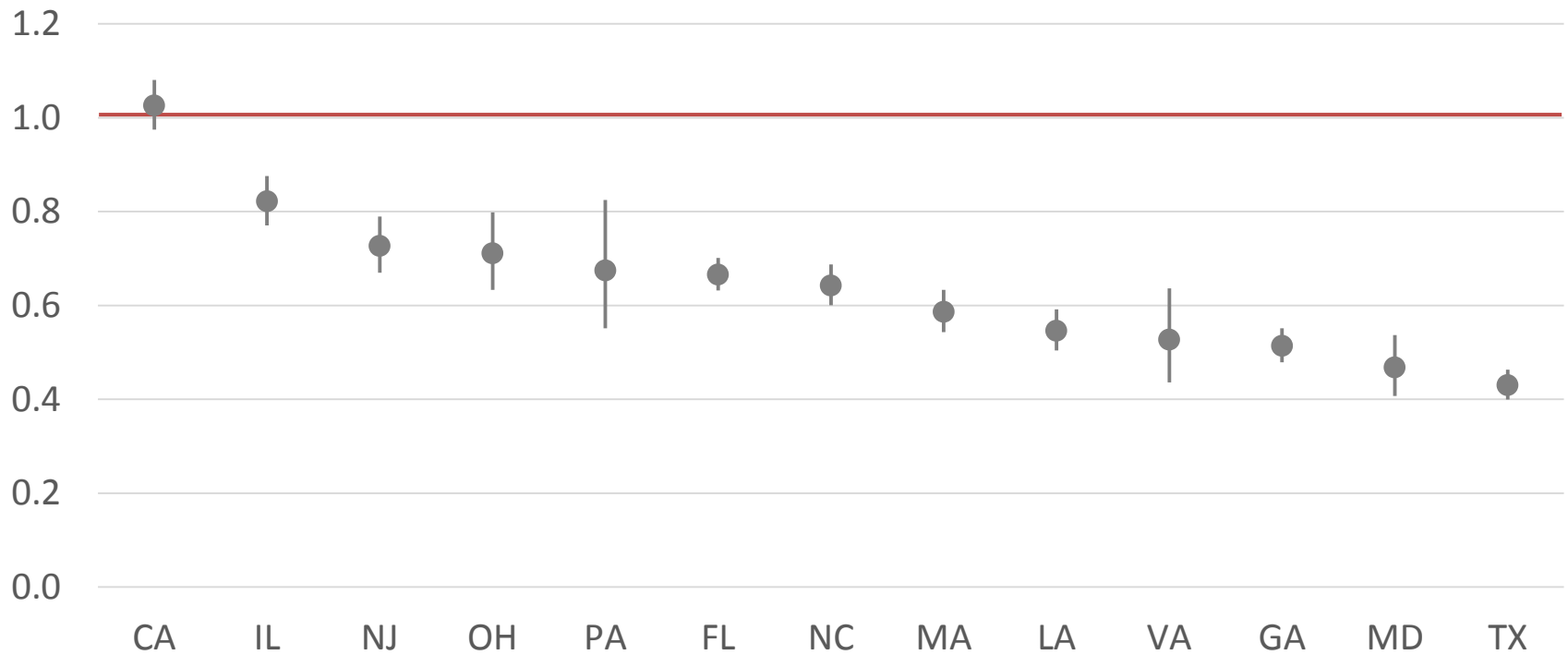
Generalized Estimating Equations Model

- Binary outcome: >90% implementation (yes/no)
- OR>1: more likely to completely implement ART
- The following factors were associated with higher odds of achieving complete implementation: older age, male, non-black, new ART regimen, recent calendar year, and living in NY.

		aOR	95% CI	p-value
Calendar year (ref=2001-2003)	2004-2006	1.29	(1.25, 1.32)	<.0001
	2007-2010	1.60	(1.54, 1.66)	<.0001

Generalized Estimating Equations Model

Adjusted OR of Complete Implementation by States (ref=NY)



All $p < .0001$, except CA

Generalized Estimating Equations Model

		aOR	95% CI	p-value
Gender (ref=female)	Male	1.04	(1.01, 1.08)	0.01
	Asian/PI/NA	1.41	(1.19, 1.66)	<.0001
Race/Ethnicity (ref=Black)	Hispanic	1.22	(1.17, 1.28)	<.0001
	Multiracial/Unknown	1.22	(1.14, 1.30)	<.0001
	White	1.16	(1.11, 1.21)	<.0001
Regimen Type (ref=PI based)	Integrase Inhibitor Based	1.17	(1.03, 1.32)	0.02
	NNRTI based	1.20	(1.16, 1.24)	<.0001
	NRTI based	1.03	(0.98, 1.07)	0.28
	Multiple Classes	0.98	(0.93, 1.04)	0.56
NRTI backbone (ref=TDF/ABC)	AZT	0.87	(0.84, 0.90)	<.0001
	ddl/d4T	0.84	(0.81, 0.88)	<.0001
	others	0.95	(0.90, 1.01)	0.10
Single tablet regimen use (ref=no)	Yes	0.98	(0.93, 1.03)	0.39

Conclusions

- Marked improvement in ART implementation between 2001 and 2010
- Adherence support programs as a potential explanatory factor
- Disparities for blacks remain
- State differences are concerning, may relate to Medicaid generosity, and merit further study

Limitations

- No viral loads or CD4 counts
- Not generalizable to the uninsured, commercially insured, and Medicare population
- Not all states were included

Implications

- National, population-based data that can be generalized to HIV patients in the U.S with Medicaid
- Can help identify areas for targeted interventions
- Differences between the results of persistence and implementation analysis

Acknowledgements

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