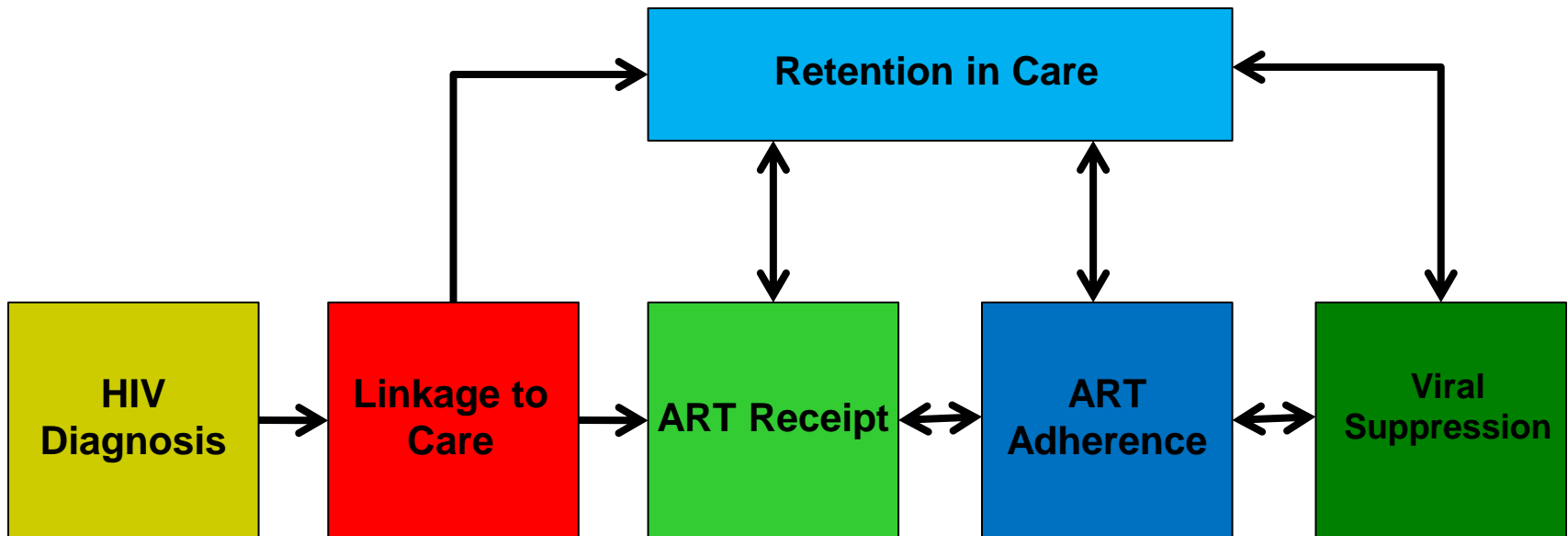# Impact of HIV Disease Severity on Retention in Care and Viral Load Suppression

Baligh Yehia[1], Ben French[1], Josh Metlay[1], Kelly Gebo[2]

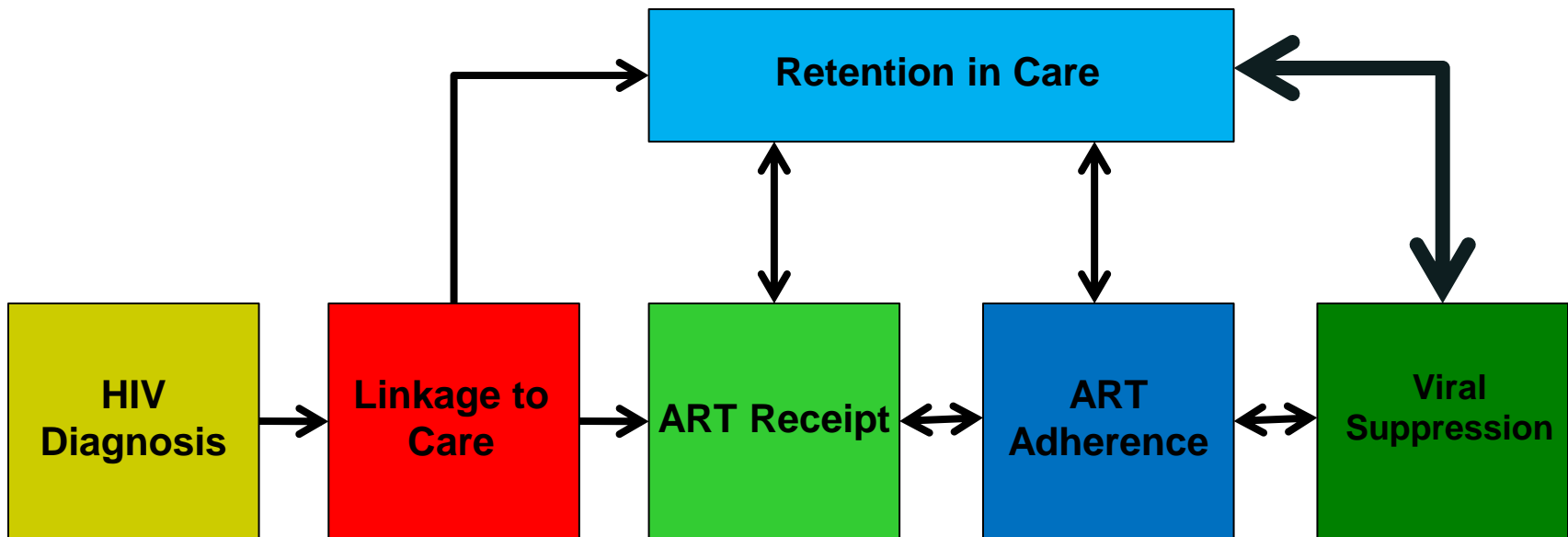[1]University of Pennsylvania, [2]Johns Hopkins University

HIV Research Network

Perelman School of Medicine
UNIVERSITY of PENNSYLVANIA

Roadmap to HIV Treatment Success

Ulett et al., 2009

Roadmap to HIV Treatment Success

- Greater decrease in HIV viral load from baseline
- Strong association with HIV viral suppression

Ulett et al., 2009, Tripathi et al., 2011, Mugavero et al. 2012

Prior Studies Did Not Account for HIV Disease Severity

Retention in care may be more important for patients with:

LOWER CD4 Counts

- higher pill burdens
- greater drug toxicity
- treatment of OIs and
  other HIV complications

HIGHER CD4 Counts

- minimal symptoms

Data are needed to determine how measures of retention in care perform in patients with varying disease severity

Yehia et al., 2012, Mugavero et al. 2012

Objectives

1) Evaluate if the **association between retention in care and viral suppression** differs for patients with varying disease severity

1) Determine if the **prognostic ability of three retention measures to predict viral suppression** differs by disease severity

Study Design and Sample

Series of **annual cross-sectional** analyses using data from 18 HIV Research Network clinics.

Inclusion Criteria:

- Adults (≥18 years)
- In care between Jan 1, 2006 and Dec 31, 2010

Exclusion Criteria:
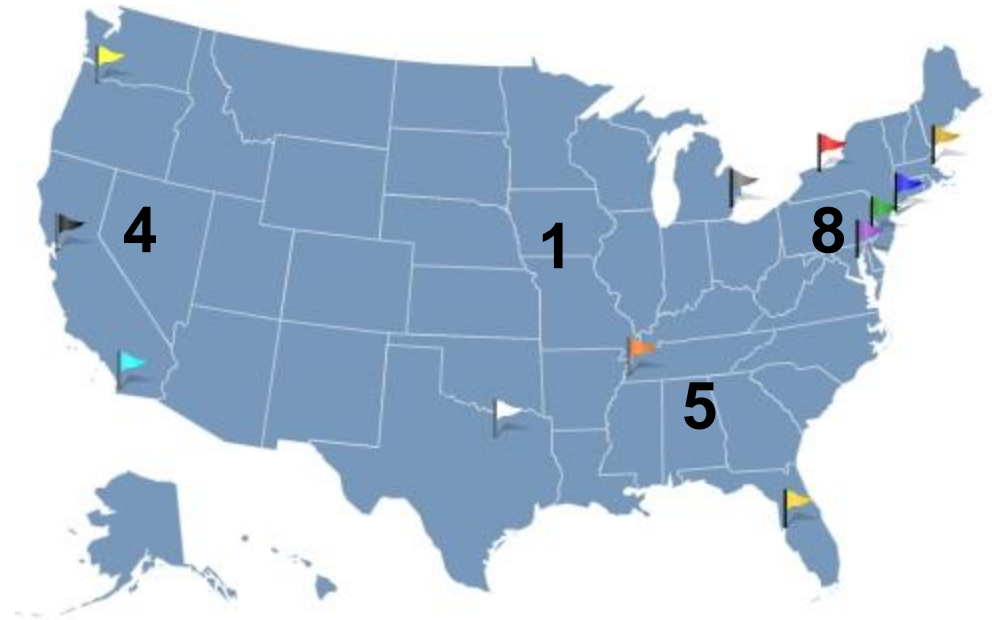
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Retention in Care Measures

Retention in Care Measures
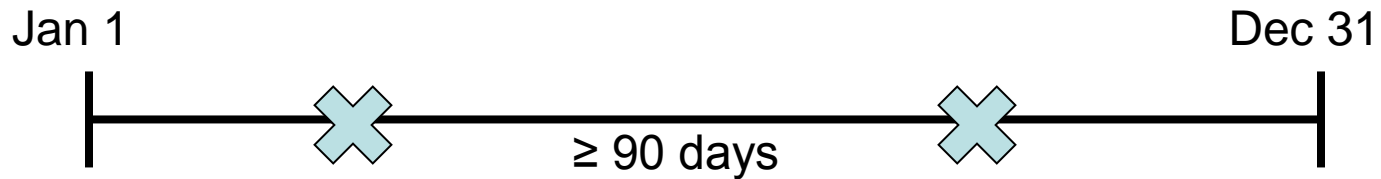
HRSA HAB Medical Visit Performance Measure

Jan 1   Dec 31

❌ ≥ 90 days ❌

6-month Gap in Care Measure

Jan 1   Dec 31

❌ < 6 months ❌

3-month Visit Constancy

Jan 1   Apr 1   Jul 1   Oct 1   Dec 31

❌   ❌   ❌   ❌

Retention in Care Measures

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3-month Visit Constancy

Jan 1   Apr 1   Jul 1   Oct 1   Dec 31

✕   ✕   ✕   ✕

Outcome – HIV Viral Suppression

Jan 1   Dec 31

± 120 days

Outcome – HIV Viral Suppression

Jan 1   Dec 31

± 120 days
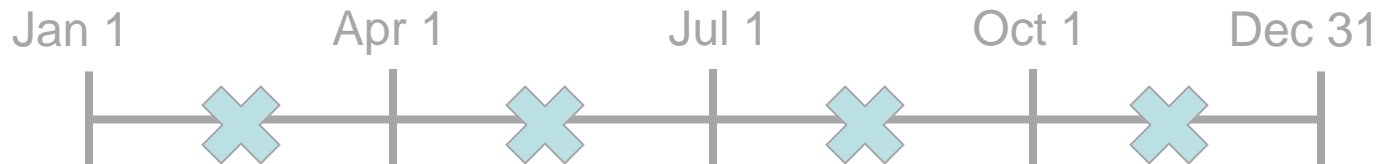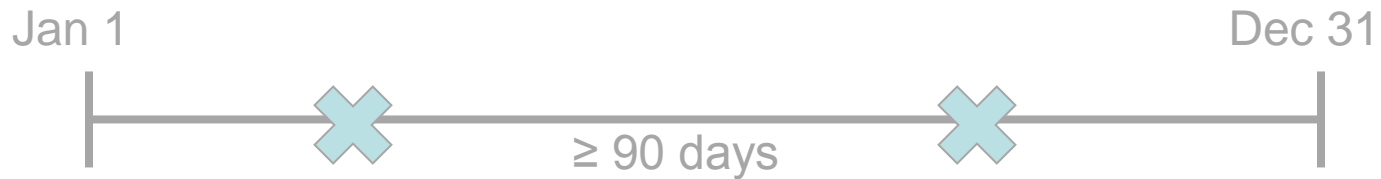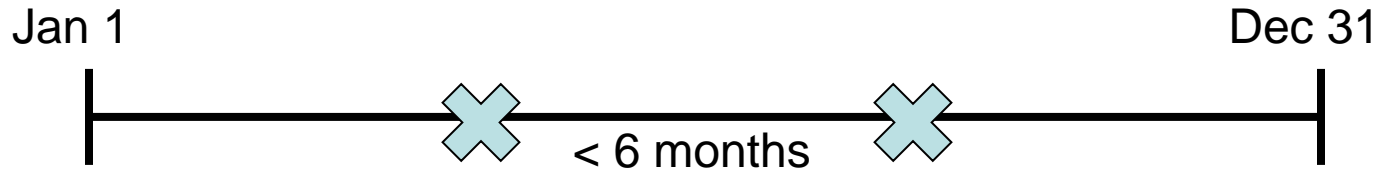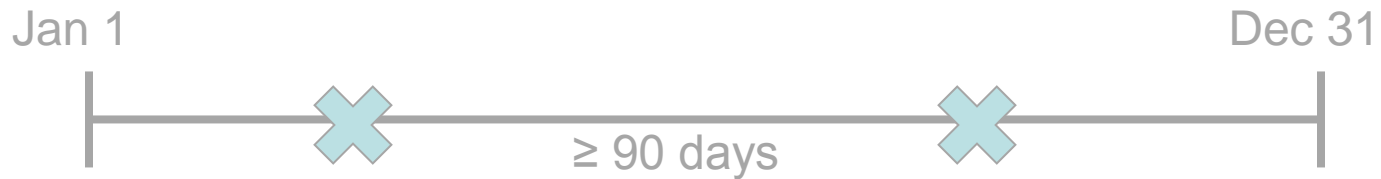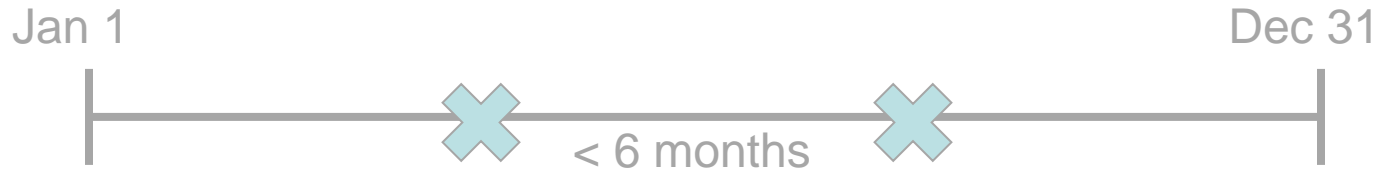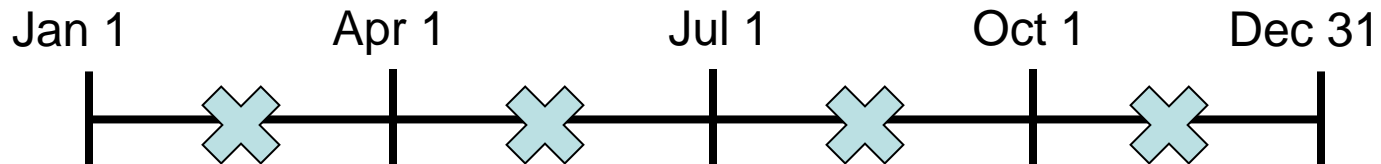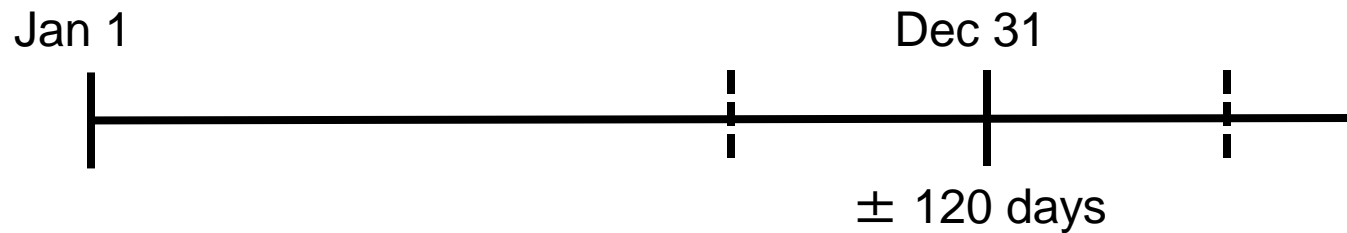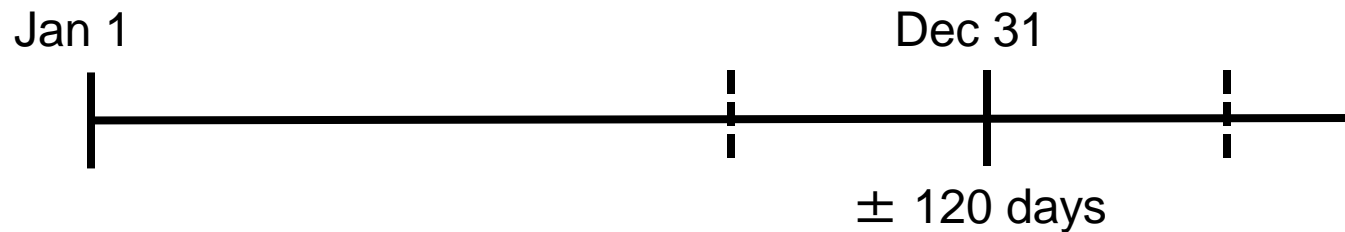
HIV Viral Suppression
≤ 400 copies/mL

Statistical Analyses

Patient years:

1					**25%**
	2				**17%**
		3			**15%**
			4		**12%**
				5	**31%**

Statistical Analyses

Retention Measure

HIV Disease Severity (CD4)

≤ 350 cells/mm^3
351-500 cells/mm^3
> 500 cells/mm^3

Covariables

Age
Sex
Race/Ethnicity
HIV Transmission Risk
Insurance Status
History of Viral Suppression

Multivariable Logistic Regression

HIV Viral Suppression

Association

Statistical Analyses

Retention Measure

❌

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351-500 cells/mm^3
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Covariables

Age
Sex
Race/Ethnicity
HIV Transmission Risk
Insurance Status
History of Viral Suppression

Multivariable Logistic
Regression with Interaction

HIV Viral Suppression

Association

Statistical Analyses

Area Under the Receiver
Operating Characteristic
Curves (AUC)

| Retention Measure | → Prediction → | HIV Viral Suppression |

Results – Study Sample

	2006 N=15,081	2010 N=18,647
Median Age (years)	44	46
Male Sex	71%	72%
Race/Ethnicity		
White	30%	28%
Black	48%	49%
Hispanic	20%	21%
Transmission Risk		
Heterosexual (HET)	41%	42%
Men who have sex with men (MSM)	36%	37%
Injection drug use (IDU)	19%	16%
First CD4 Count in Year		
Median	389	442
≤ 350 cell/mm^3	42%	34%
351-500 cell/mm^3	22%	22%
> 500 cell/mm^3	36%	44%

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Results – Retention in Care & Viral Suppression

HRSA HAB Measure (83-85%)

No 6-Month Gap (82-84%)

HIV Viral Suppression (64-80%)

3-Month Visit Constancy
1 (12-14%)
2 (20-22%)
3 (29-30%)
4 (34-39%)

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86% with available data

Associations Between Retention in Care & Viral Suppression

Retention Measure	Adjusted Odds Ratio		
	≤ 350 cell/mm^3	351-500 cell/mm^3	> 500 cell/mm^3
HRSA HAB Retained (vs. Not Retained)	2.79 (2.55-3.05)	2.29 (2.02-2.59)	1.68 (1.52-1.86)
6-Month Gap No Gap (vs. Gap)	2.12 (1.95-2.31)	1.80 (1.61-2.01)	1.55 (1.42-1.69)
3-Month Visit Constancy			
1	1 [Reference]	1 [Reference]	1 [Reference]
2	1.88 (1.68-2.11)	1.54 (1.31-1.80)	1.21 (1.07-1.37)
3	3.01 (2.70-3.26)	2.42 (2.08-2.82)	1.71 (1.52-1.93)
4	4.22 (3.78-4.71)	3.38 (2.91-3.93)	2.10 (1.86-2.36)

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Chi-square test of independence demonstrated statistically significant differences in AOR across the three CD4 groups (p-value <0.001).

Ability of Retention Measures to Predict Viral Suppression
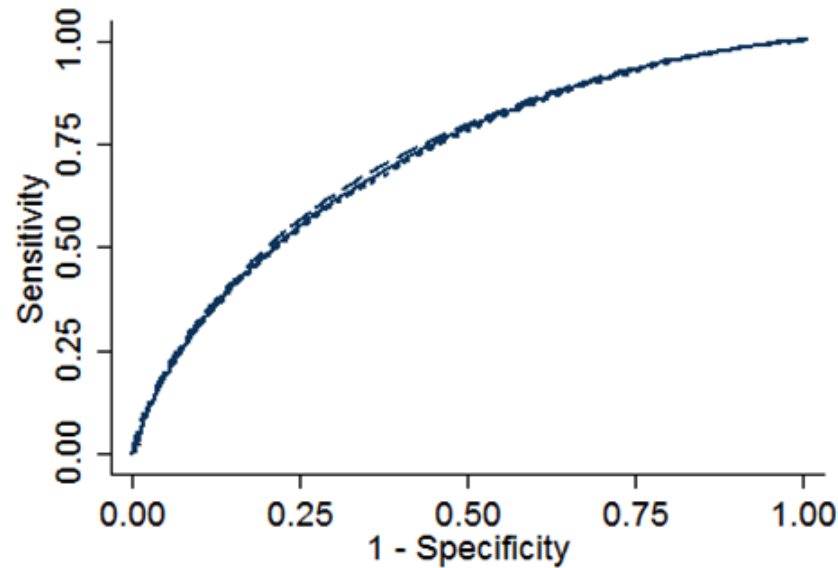
CD4 Count Group	HRSA HAB	6-Month Gap	3-Month Visit Constancy
≤ 350 cell/mm^3	0.68	0.67	0.69
351-500 cell/mm^3	0.70	0.69	0.71
> 500 cell/mm^3	0.69	0.68	0.70

Conclusions

1) All three retention measures were significantly associated with viral suppression.

2) The association between retention in care and viral suppression differed by disease severity; strongest among patients with low CD4 counts.

1) The ability of retention measures to predict viral suppression was similar (AUC 0.67-0.71) across the spectrum of HIV disease severity.

Potential Limitations

1) Data only reflects care provided at HIVRN clinics; patients may have received care at other locations.

2) HIVRN data are not nationally representative; rates of retention may differ for clinics with a different mix of patients.

3) We did not have access to appointment schedules and thus could not examine other measures of retention such as appointment adherence and missed visits.

Implications

1) While retention in care is important for all HIV-infected patients, it may be more important to achieving virologic suppression in persons with advanced HIV disease.

1) Retaining people with lower CD4 counts in care will be critical to fulfilling the goals of the NHAS and the test and treat approach to HIV prevention.

Thank You!

Mentors:

Kelly Gebo, MD, MPH – Johns Hopkins

Joshua Metlay, MD, PhD – Penn

Funders:

HIVRN – AHRQ, HRSA

Baligh Yehia – NIH/NIMH K23-MH097647