

Predictors for longitudinal engagement and retention in care among women living with HIV in the US

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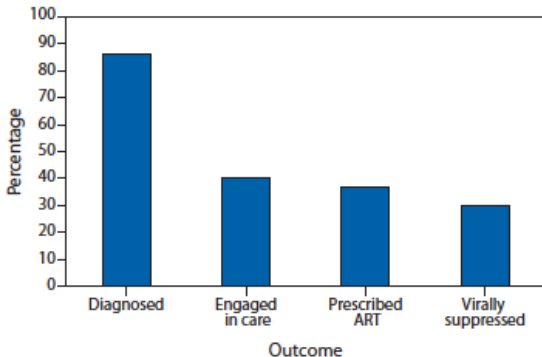
December 7th, 2016
Inter-CFAR Joint Symposium on HIV Research in Women

Goals of presentation

- 1 Introduction to a new statistical framework and methodology
- 2 Findings from application of the new method

Identify leaks in the cascade

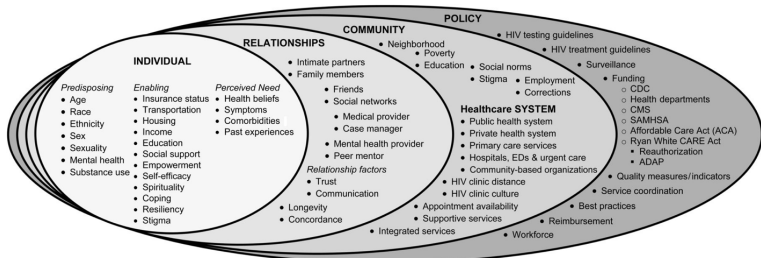
FIGURE 1. Estimated percentage of persons living with HIV infection,* by outcome along the HIV care continuum — United States, 2011



Abbreviations: HIV = human immunodeficiency virus; ART = antiretroviral therapy.

* N = 1,201,100.

Known correlates of engagement in care



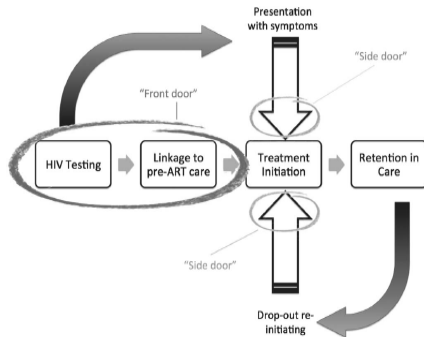
Mugavero et al. CID. 2013: Individual (intrapersonal), relationship (interpersonal), community, healthcare system, and healthcare policy factors that influence the processes of *engagement in care*.

- Common approaches:
 - Short term retention
 - Capture cross-sectional snapshot of engagement or retention: logistic regression

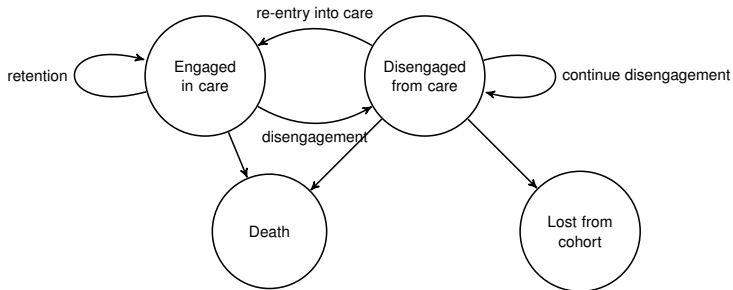
Challenges in modeling engagement and retention in care

Longitudinal patient behavior is complex

- Multiple states related to engagement in care: loss to follow up, mortality, transfer-out
- Progression not 'linear' but cyclic



Operationalizing retention aspects of care: state transitions



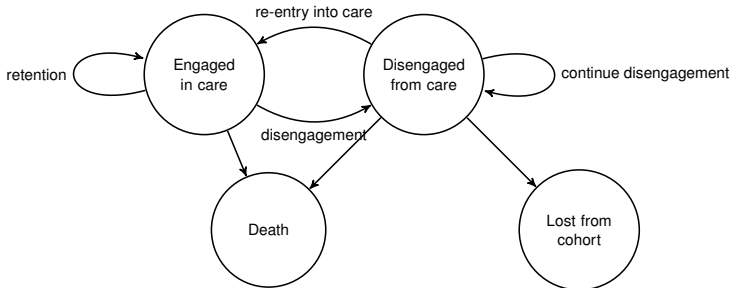
- Patient retention dynamics: transition from one state to another
 - transition from engaged to engaged: retention
 - transition from disengaged to engaged: re-entry into care

Illustration of SSM using data from a US cohort

- CNICS: The CFAR Network of Integrated Clinical Systems
- An integrated clinical database composed of EMR-based resources from 8 sites in the US (CWRU, Fenway, JHU, UAB, UCSD, UCSF, UNC, and UW)
- Eligibility: HIV infected patients who are engaged in CNICS-affiliated care
- Electronic health record
 - captures comprehensive clinical information
 - demographics, diagnoses, laboratory test, medication, health care utilization, vital status, patient reported outcomes, antiretroviral resistance, and biologic specimens data...

Operationalizing the retention aspect of care in context

- Use four (mutually exclusive) states to represent the retention aspects of care



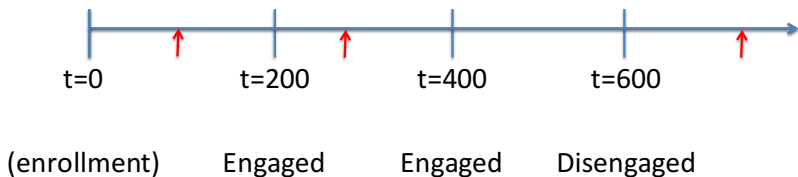
- Temporal trends and covariate effects associated with the cyclic processes of engagement and retention

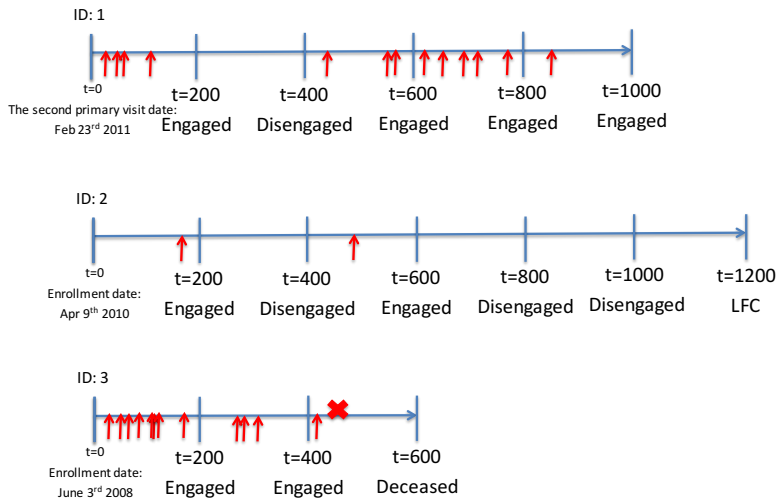
Organizing data into states



(enrollment)

Organizing data into states



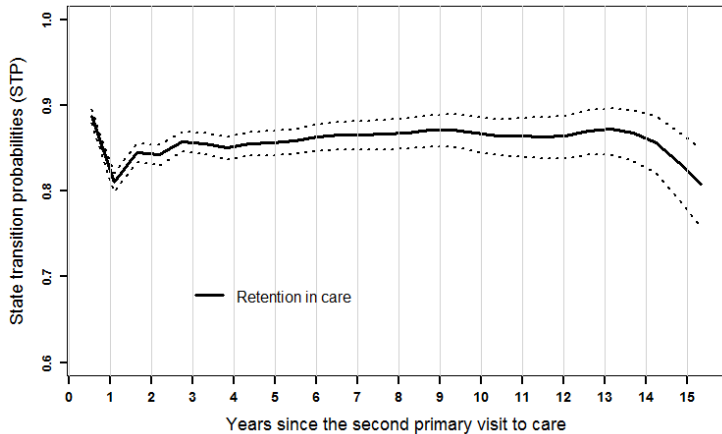


Analysis of women in CNICS

- Data from 5,940 WLWH who engaged in and followed from 8 CNICS sites between 1996 and 2015
- Majority: African American (63%) and non-Hispanic (84%)
- Median age 39, CD4 357, and viral load 21,000
- Key variables:
 - CD4 count, viral load, ART status, OBGYN
 - age, race/ethnicity, AIDS, injection drug use (IDU), transgender
 - calendar year and site

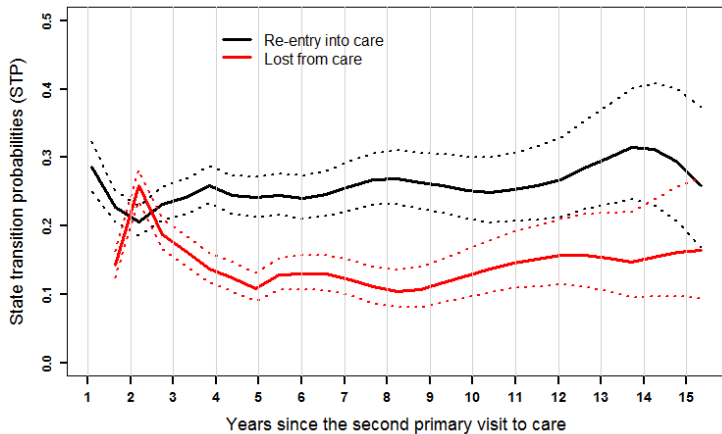
Temporal trends

Retention curve



Temporal trends

Re-entry and lost from cohort (following disengagement)



Covariate effects: transition from **engaged**

Effects of clinical characteristics: CD4 counts, viral load, and ART status (all time-varying), and OBGYN (time-fixed)

	Engaged	Disengaged	Death
Transition probability	.86	.13	.01
CD4 < 250	—	—	—
CD4 250-500	—	0.87*	0.33*
CD4 \geq 500	—	0.80*	0.15*
Viral load	—	1.24*	1.23*
On ART	—	0.85*	0.61*
AIDS	—	0.68*	3.19*
OBGYN	—	0.53*	0.46*

Covariate effects: transition from **engaged**

Effect of other risk factors: Age, IDU, and transgender (time-fixed)

	Engaged	Disengaged	Death
Caucasian	—	—	—
AA	—	0.96	0.82
Others	—	0.96	0.65
Hispanic	—	0.73*	0.39
Age \geq 40	—	0.72*	1.59*
IDU	—	1.02	1.42*
Transgender	—	0.96	1.24

Covariate effects: transition from **disengaged**

	Engaged	Disengaged	LFC	Death
Transition probability	.25	.58	.15	.01
CD4 < 250	—	—	—	—
CD4 250-500	—	1.01	1.00	0.62*
CD4 ≥ 500	—	0.97	0.95	0.44*
Viral load	—	1.08*	0.99	1.38*
On ART	—	0.86	1.30*	0.83
AIDS	—	0.64*	0.82*	1.46*
OBGYN	—	0.61*	0.69*	0.39*

Covariate effects: transition from **disengaged**

	Engaged	Disengaged	LFC	Death
Caucasian	—	—	—	—
AA	—	0.92	0.68*	0.79
Others	—	0.87	0.84	0.97
Hispanic	—	0.92	0.77*	0.63
Age \geq 40	—	0.93	1.06	1.55*
IDU	—	1.13	0.91	2.24*
Transgender	—	1.06	0.88	1.62

Results summary

- 1 The first two years might be the optimal time to prevent future disengagement and ultimate loss
- 2 Among those engaged
 - Sicker patients who are not on ART and yet developed AIDS defining illness: more likely to disengage and die
 - No racial disparity found in long-term engagement and retention behavior
 - Younger non-Hispanic women are more likely to disengage
- 3 Among those disengaged
 - Patients with higher viral load who have yet developed AIDS: more likely to continue disengaged
 - AA and Hispanics are less likely to be lost: might be due to limited care resources and awareness
- 4 There was a site and temporal variations

Conclusions

- Can inform the development of guidelines that are tailored to female patient characteristics in CNICS, customized to sub-populations at highest risk of falling out of care
- Develop risk score to flag patients at higher risk of falling out of care
- The first study to make full use of 20 years of cohort data from the HAART era
- Acknowledge the fact that engagement and retention in care is a cyclic process
- Opportunity: WIHS

Acknowledgment

- X Wu (Brown), M Mugavero (UAB), SR Cole (UNC), B Lau (Hopkins), BL Genberg (Brown), and JW Hogan (Brown)
- CFAR supplement (P30 A1042853, NIAID) for “A Statistical Framework for Analysis of the HIV Care Cascade using CNICS”
- R13 AI127307-01 “Inter-CFAR (Center for AIDS Research) Collaborative Symposium on HIV Research in Women”