Association between Four Measures of Retention in Care and Virologic Failure

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BACKGROUND

- Sustaining viral suppression (VS) is the ultimate goal of HIV care and treatment.
- Retention in care is a critical step along the HIV care continuum leading to VS.
- Retention has been measured in various ways without identification of a gold standard for predicting VS.
- Therefore, the relationship between various retention measures and sustained VS merits further exploration.

OBJECTIVES

- To compare the association between four retention measures and virologic failure (VF) among an urban cohort of HIV-infected persons in care

METHODS

DC COHORT

- A longitudinal observational study of HIV-infected persons in care in Washington, DC at 15 clinical sites
- Data abstracted from participants' medical records and linked to DC Dept. of Health data
- Included participants enrolled for at least 12 months from 1/2011 to 9/2014, age ≥ 18 years from 9 sites, with an undetectable viral load at study entry

ANALYSIS

- Outcome: VF defined as a viral load (VL) >200 copies/ml during follow-up
- Exposure: retention as measured in four ways
  1. No gaps in care > 6 months
  2. 4-month visit constancy
  3. Institute of Medicine (IOM) measure: >2 visits at least 90 days apart in 12-months
  4. Health and Human Services (HHS) measure: >1 visit in each 6-month interval in 24 months with ≥60 days between visits
- Performed multivariable Cox proportional hazards regression to assess the relationship between each retention measure and VF, modeled as a recurrent event

RESULTS

Table 1. Socio-Demographics, Clinical Characteristics, and Retention Estimates of HIV-Infected Adult Patients with an Undetectable Viral Load at Enrollment in the DC Cohort (N=1,958)

Characteristic	Median (IQR) or Frequency (%)
Median study follow up time (months)	35.6 (27.6-40.0)
Median baseline age (years)	49.3 (41.0-56.2)
Sex at birth	
Male	1,530 (78.1%)
Female	428 (21.9%)
Race/ethnicity[1]	
Non-Hispanic black	1,402 (71.6%)
Non-Hispanic white	420 (21.5%)
Other/unknown	136 (6.9%)
Insurance type[1]	
Private	681 (34.8%)
Medicaid	449 (22.9%)
Medicare	286 (14.6%)
Other/unknown	542 (27.7%)
HIV transmission risk[1]	
MSM[2]	1,055 (53.9%)
High risk heterosexual	527 (26.9%)
IDU	267 (13.6%)
Other/unknown	109 (5.6%)
DC Cohort site type	
Academic/hospital based organization	1195 (61.0%)
Community based organization	763 (39.0%)
Median duration of HIV infection at baseline (years)[1]	11.9 (6.5-23.1)
Median baseline CD4 cell count (cells/µl)[1]	568 (407-763)
Retention Estimates[3]	
Median % time without a 6-month gap in care	100 (79.7-100)
Median 4-month visit constancy	66.7 (50-87.5)
Median IOM continuous care measure	66.7 (50-100)
Median HHS retention in medical care[4]	50 (0-100)

[1] Variables for which the DC DOH may have contributed data
[2] Includes patients who reported both MSM and IDU transmission risk
[3] Retention estimates reflect percentage of follow up time in which patients met the specific measure
[4] Limited to only those patients with at least 24 months of follow up (n=1,617)

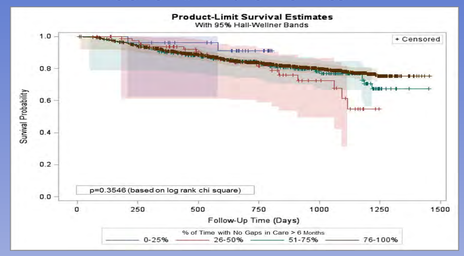
Table 2. Associations between Measures of Retention in HIV Care and Time to Virologic Failure among Patients with Undetectable Viral Load at Study Enrollment

	Retention Measure[1]	Follow-up time	Hazard ratio (95% CI)
Analysis #1: Patients with at least 12 months of follow up (N=1,958)[2]	% of time without a gap > 6 months	0-2 yrs	**1.24 (1.06-1.45)**
		2-4 yrs	0.896 (0.676-1.19)
	% of time meeting 4-month visit constancy	0-2 yrs	1.03 (0.912-1.17)
		2-4 yrs	0.84 (0.658-1.07)
	% of time meeting IOM continuous care	0-2 yrs	0.97 (0.880-1.07)
		2-4 yrs	**0.74 (0.615-0.885)**
Analysis #2: Patients with at least 24 months of follow up (N=1,617)[2]	% of time meeting HHS retention in medical care	0-2 yrs	0.97 (0.902-1.05)
		2-4 yrs	0.87 (0.761-0.982)[3]

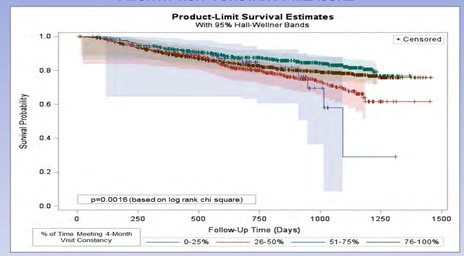
[1] Retention measures modeled as per 25% increase in retention
[2] Adjusted for baseline age, sex, race/ethnicity, insurance type, HIV transmission risk, site type, duration of follow up, baseline CD4 count, baseline ART regimen type, change in ART regimen during follow up, and baseline AIDS status
[3] Not statistically significant under the Bonferroni corrected p-value for multiple comparisons

Figures 1- 4. Kaplan Meier Curves of Virologic Failure Comparing Quartiles for Each Retention in Care Measure

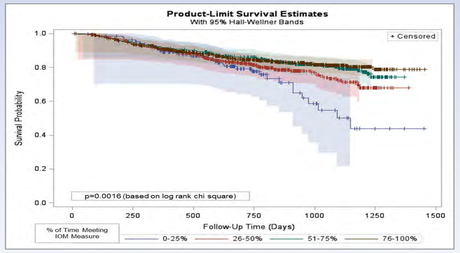
NO GAPS IN CARE > 6 MONTHS MEASURE



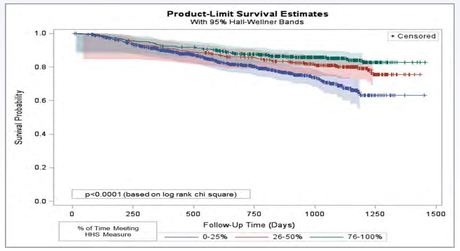
4-MONTH VISIT CONSTANCY MEASURE



IOM CONTINUOUS CARE MEASURE



HHS RETENTION IN MEDICAL CARE MEASURE



CONCLUSIONS

SUMMARY

- Both crude (Figures 1- 4) and adjusted associations (Table 2) between retention and VF varied by retention measure.
- During the first 2 years of follow-up, an increasing percent of time without a gap in care >6 months was associated with an increased rate of VF (aHR: 1.24, 95% CI: 1.06-1.45).
- During the last 2 years of follow-up, an increasing percent of time in which the IOM measure was met was associated with a decreased rate of VF (aHR: 0.74, 95% CI: 0.62-0.89).
- Other retention measures were not associated with time to VF.

LIMITATIONS

- Data reflect only those patients who consented to be in the DC Cohort.
- VL data were limited to consent date forward, so there is a lack of information on patients' histories of VS prior to study enrollment.
- Retention may have been underestimated as VL tests could not be used as proxies for routine HIV care visits since values of VLs were also used to estimate VF.

DISCUSSION

- Our results suggest that monitoring retention and its association with VF varies depending on how retention is defined.
- After 2 years, the rate of VF declined when the IOM measure was met.
- None of the retention measures was associated with a decreased rate of VF during the first 2 years of follow-up.
- Early in follow-up, there was a direct relationship between the no gaps in care > 6 months measure and VF, a finding that warrants additional analysis.
- Further follow-up will enable the assessment of whether these patterns are maintained over time.

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