MEMS-defined treatment interruptions independently predict HIV RNA controlling for average adherence in rural Uganda

Maya Petersen, MD, PhD
for David Bangsberg, MD, MPH

Massachusetts General Hospital and Harvard Medical School

Collaborators

- Alexander Tsai, Harvard University
- Jessica Haberer, Massachusetts General Hospital
- Conrad Muzoora, Mbarara University of Science and Technology
- Peter Hunt, University of California at San Francisco
- Jeffrey Martin, UCSF

Background

- Adherence (dose-taking execution[1]) closely predicts HIV RNA viral suppression[2,3]

- Recent studies suggest treatment interruptions (lack of persistence[4]) contribute to virologic failure[5,6]

- Treatment interruptions due to structural & economic barriers are a common pattern of adherence in resource limited settings[7,8]

[1] Urquhart, Clin Pharmacokinet 1997
[2] Bangsberg, AIDS 2000
[3] Paterson, Annals 2000
[4] Bae, AIDS 2011
[5] Parienti, PLoS ONE 2008
[6] Genberg, AIDS 2012
[7] Ware, PLoS Med 2009
[8] Oyugi, AIDS 2004

Study aim

- To compare the relative contribution of average adherence vs. non-structured treatment interruptions to virologic failure among patients initiating ART in a rural, resource-limited setting

The UARTO Cohort
Uganda AIDS Rural Treatment Outcomes

- Treatment-naïve HIV-infected adults initiating ART in rural, southwest Uganda

- Followed with quarterly structured interviews and HIV RNA determinations

- ART adherence measured with MEMS

- Study commenced in 2005 and is currently ongoing

Statistical analysis

- Dependent variable is viral failure, defined as HIV RNA viral load >400 copies/mL

- Primary exposures, based on a 90-day time window

  - Average adherence (percentage of doses taken)
  - Any treatment interruption lasting >10 d (binary)

- Logistic regression with cluster-correlated robust estimates of variance

Participant characteristics

- 466 persons living with HIV/AIDS

- Mean age 35 y, 71% women, 42% married, baseline CD4 count 162 (±113)

- One year's worth of MEMS adherence data

- Average 90-day adherence was 85%

- 101 treatment interruptions among 38 (8.2%) participants, lasting a median of 11 d (IQR, 8-21 d)

Associations with VL suppression

	AOR (95% CI)
Average adherence only	0.83 (0.75-0.92)
Treatment interruption only	3.66 (1.92-6.98)
Both variables together	
Average adherence	0.88 (0.78-0.99)
Treatment interruption	2.61 (1.30-5.22)

All estimates adjusted for age, sex, marital status, education, employment, household asset wealth, distance to clinic, AUDIT-C screen for hazardous drinking, CD4+ count, Hopkins depression score, and duration of treatment

Limitations

- MEMS may misclassify dose-taking execution
  - Stopping MEMS may not signify stopping ART
  - MEMS use may not signify ART ingestion
- MEMS data were reconciled with clinic visit notes, unannounced pill counts, pharmacy visits, and participant self-report
  - However, misclassification could still occur

Discussion

- More research on the individual, interpersonal, and structural determinants of treatment interruptions are needed

- In contrast to MEMS-based measurements, new wireless technologies may hold promise for detecting interruptions and offering possibilities for intervention *before* viral failure occurs[9]

[9] Haberer, AIDS Behav 2010; AIDS Behav 2012

Conclusions

- This analysis provides support for examining patterns of adherence beyond average dose-taking

- Treatment interruptions have additional predictive power even in the setting of high average adherence

Acknowledgments