Hair and Point-of-Care Tenofovir Urine Self-Collection Feasible With Urine TFV Predicting Viral Load

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BACKGROUND

- Only 68% of men who have sex with men (MSM) with HIV have achieved virologic suppression (VS).
- A resurgent stimulant epidemic among MSM contributes to antiretroviral therapy (ART) adherence challenges.
- Objective monitoring of ART adherence and stimulant use via drug-level testing can inform interventions.
- The UCSF Hair Analytical Laboratory (HAL) has developed hair assays for ART and substance use to assess cumulative use, along with a low-cost urine point-of-care (POC) tenofovir (TFV) assay.
- Hair and urine samples can be self-collected for remote monitoring.
- Acceptability of self-collection for these assays has not been rigorously studied, particularly among Black MSM.

METHODS

- The ARCHES study is a national cohort of 1,000 MSM with HIV recruited from a geospatial social networking application and followed for one year.
- Viral load (VL) was collected at local Quest sites; participants self-administered the mailed urine assay and uploaded photos of the results; hair samples were mailed back in kits assembled by the study team.
- Longitudinal analyses to assess viral suppression (<200 copies/mL) used generalized estimating equations with exchangeable correlation structures to account for repeated measures. Models were adjusted for demographics, urine tenofovir results, and self-reported stimulant use.
- Logistic regression assessed hair self-collection rates.



Figure 1. Hair (left) and urine (right) kits sent to participants, shipped together with a return label.

The ARCHES study demonstrates the acceptability and feasibility of self-collection of hair samples and urine point-of-care tenofovir assays for remote monitoring across populations.

RESULTS

Figure 2. Odds of Longitudinal Viral Suppression

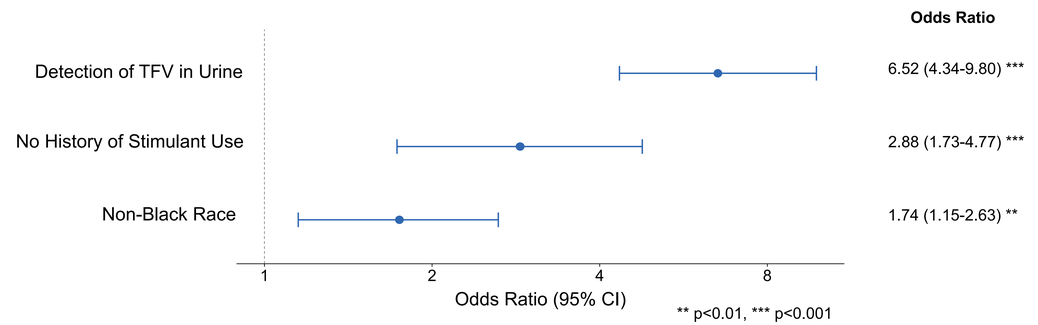


Figure 3. Completion of Urine TFV POC Assay by Race

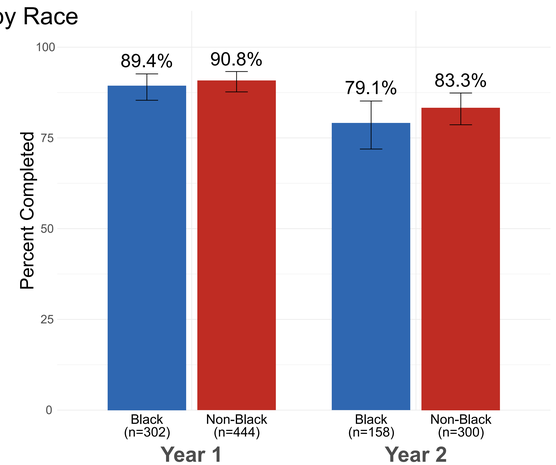
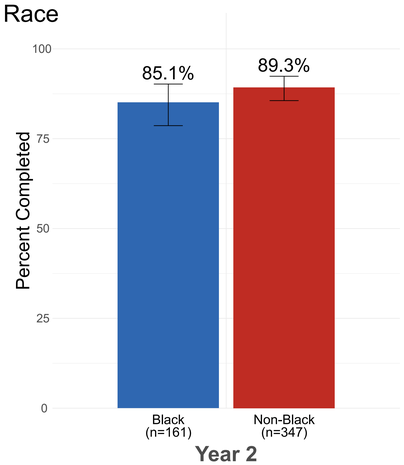


Figure 4. Completion of Hair Sample by Race



RESULTS cont.

- *Demographics*
  - Median age 40 [IQR: 34-51]; 40% Black
  - 72% reported ever using stimulants
  - 86% ever achieved VS <200 copies/mL
- **Longitudinal VS was predicted by urine TFV POC detection**, no history of stimulant use, and non-Black race. **(Figure 2)**
- The TFV POC assay demonstrated high sensitivity (.91) and moderate specificity (.48) for VS.
- Overall, 90% and 82% of eligible participants completed the TFV POC assay in years 1 and 2, and 88% of eligible participants completed hair self-collection in year 2.
- Black race did not predict POC assay completion (90% vs. 91%, *p*=.803, **Figure 3**) nor hair self-collection (85% vs. 89%, *p*=.218, **Figure 4**), after adjusting for age and self-reported stimulant use.
- Self-reported previous stimulant use was associated with urine TFV POC test submission (OR: 0.25, *p<.001*).

CONCLUSIONS

- Most eligible participants completed the TFV POC assay and self-collected hair samples, supporting feasibility and acceptability of these methods in MSM.
- The TFV POC assay demonstrated a strong association with VS, indicating potential use in health interventions.
- Black race was not associated with assay completion, despite previous speculation that hair self-collection in particular may not be successful among this group.
- Hair and urine POC self-collection are promising approaches for substance use and adherence monitoring that can be used in remotely delivered studies and interventions.

PLAIN LANGUAGE SUMMARY

We found that self-collection of hair samples and testing for the presence of HIV medication in urine at home was acceptable in our study population, regardless of participants' race. Additionally, detectable HIV medication in urine was associated with having undetectable virus in the blood.