Costs and Clinic Flow of Point-of-Care Urine Tenofovir and HIV Viral Load Testing in South Africa

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Melody Wang,[1,3] Pravikrishnen Moodley,[2] Mlungisi Khanyile,[3] Elliot Bulo,[4] Makhosazane Zondi,[3] Keshani Naidoo,[3] Yukteshwar Sookrajh,[4] Jienchi Dorward,[3,5] Nigel Garrett,[3,8] Paul K Drain,[1,6,7] Monisha Sharma[1,7]

[1]Department of Global Health, University of Washington, Seattle, WA, [2]National Health Laboratory Service (NHLS), South Africa, [3]Centre for the AIDS Program of Research in South Africa (CAPRISA), University of KwaZulu-Natal, Durban, KwaZulu-Natal, South Africa, [4]eThekwini Municipality Health Unit, eThekwini Municipality, Durban KwaZulu-Natal, South Africa, [5]Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, Oxfordshire, United Kingdom, [6]Department of Medicine, University of Washington, Seattle, WA, [7]Department of Epidemiology, University of Washington, Seattle, WA, [8]Discipline of Public Health Medicine, School of Nursing and Public Health, University of KwaZulu-Natal, Durban, KwaZulu-Natal, South Africa

BACKGROUND

- Point-of-care (POC) urine tenofovir (TFV) tests can provide timely results on antiretroviral therapy (ART) adherence to support clinical management in clinics and complement more costly POC VL testing.
- However, there are a lack of data on costs and feasibility of integrating POC testing into HIV clinics in sub-Saharan Africa.

Objective:

Estimate total costs and clinical flow of POC adherence monitoring within public healthcare clinics in South Africa.

METHODS

- Conducted microcosting within the STREAM HIV randomized implementation trial[1] evaluating POC TFV in a government clinic in Durban, South Africa (NCT04341779).
- POC HIV VL costs from the STREAM pilot study[2] in the same clinic setting was updated using the gross domestic product (GDP) price deflator and new prices for test cartridges.
- Time-and-motion observation was conducted to assess staff and client time needed for POC TFV testing.
- Estimated financial and economic costs using a provider (ministry of health) perspective and 3% annual discount rate.

COST RESULTS

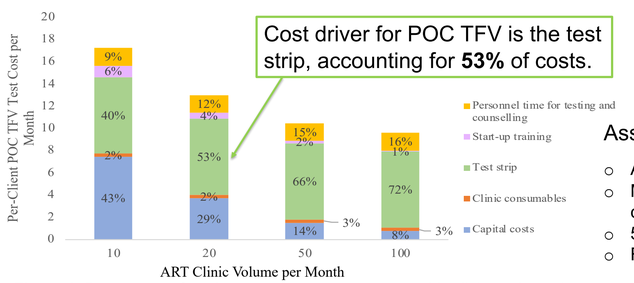
- POC TFV and VL testing costs were estimated at **USD $13** and $30 per-client, respectively, assuming a clinic volume of 20 ART initiations/month.

Table 1. Per-test cost of POC TFV testing at varying clinic volumes in South Africa (2022 USD).

Cost Per Patient	POC Costs by Clinic Testing Volumes (POC TFV Tests Done per Month)			
Cost Category	10	20	50	100
Capital costs	7.42	3.71	1.48	0.74
Clinic consumables	0.29	0.29	0.29	0.29
Test strip	6.86	6.86	6.86	6.86
Start-up training	1.07	0.54	0.21	0.11
Personnel time for testing and counselling	1.58	1.58	1.58	1.58
Total cost per test	17.22	12.97	10.43	9.58

KEY FINDINGS

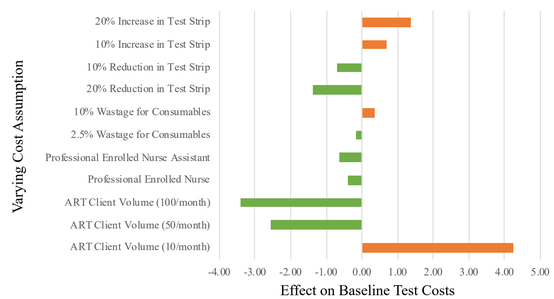
POC TFV testing can be administered at **reasonable costs**, takes **approximately 10 minutes**, and therefore may be **feasible to implement** in South African clinics.



Assumptions:

- ART clinic volume of 20/month
- Median time for professional nurse cadre conducting test
- 5% wastage of clinic consumables
- Research cost of test strip

Figure 1. Percentage of total costs per category over monthly clinic testing volumes.



Cost estimates were sensitive to **ART clinic volumes** and **test strip price**, but robust to task shifting to lower level HCW cadres and % of consumables wasted.

- Variable total costs were compared against a baseline per-client cost of USD $12.97 for POC TFV tests.

Figure 2. Sensitivity analysis assessing potential impacts of varying cost assumptions.

CLINICAL FLOW RESULTS

- Median time of **TFV testing took 9:22** (19% of total clinic visit) from sample collection to counseling.
- 29% of the clinic visit time included direct clinical care.
- Waiting in line for ART took most (48%) of the clinic visit time.

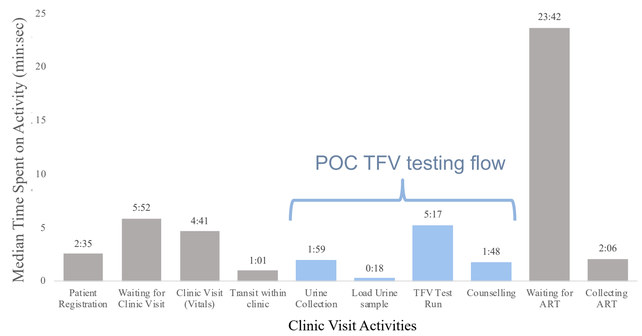


Figure 3. Clinical flow showing median time by activity during a complete clinic visit including objective adherence monitoring.

CONCLUSION & FUTURE DIRECTIONS

- Findings can inform policy decisions and budgetary planning for ART monitoring in South Africa and other LMICs considering POC TFV testing for adherence monitoring in complement with other diagnostic technologies.
- In addition to aiding drug adherence among PLHIV, results may encourage the use of POC TFV testing as inexpensive tools to support PrEP adherence and guide HIV drug resistance testing.

FUNDING & ACKNOWLEDGEMENTS

This project was made possible thanks to funding from the the NIH (R01AI147752) and UW. We would like to thank all the participants, health care providers, and staff at our host organization CAPRISA for their generous support in Durban, South Africa.

AUTHOR CONTACT INFORMATION

Melody Wang, MSPH
PhD Candidate, Implementation Science
Department of Global Health | University of Washington
Honorary Research Fellow | Center for the AIDS Programme of Research in South Africa
Email: mqwang@uw.edu | LinkedIn: www.linkedin.com/in/wangmelody

[1]Bardon, Ashley R., et al. "Simplifying TREAtment and Monitoring for HIV (STREAM HIV): protocol for a randomised controlled trial of point-of-care urine tenofovir and viral load testing to improve HIV outcomes." *BMJ open* 11.10 (2021): e050116.
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