Misdiagnosed HIV infection in pregnant women initiating universal ART in South Africa

CROI 2017 Poster # 992
Contact: az2258@cumc.columbia.edu

Allison Zerbe[1], Nei-yuan M. Hsiao[2,3], Tamsin Phillips[4,5], Kirsty Brittain[4,5], Elaine J. Abrams[1,6], Landon Myer[4,5], for the Maternal Child Health - Antiretroviral Therapy (MCH-ART) study

(1) ICAP, Columbia University, Mailman School of Public Health, New York, USA; (2) Division of Medical Virology, University of Cape Town, South Africa; (3)National Health Laboratory Services, Groote Schuur Hospital, Cape Town, South Africa, (4) Division of Epidemiology and Biostatistics, University of Cape Town, Cape Town, South Africa; (5) Centre for Infectious Disease Epidemiology & Research, University of Cape Town, South Africa; (6) College of Physician & Surgeons, Columbia University, New York, USA

Background

- Rapid diagnostic tests (RDTs) are used globally to diagnose HIV infection, but with roll-out of universal eligibility for antiretroviral therapy (ART) there is concern that false positive (FP) RDTs could result in misdiagnosis of HIV infection and inappropriate ART initiation.
- Confirmatory viral load testing before ART initiation (pre-ART VL) could be used to identify FP RDT results but the cost and effectiveness of universal pre-ART VL testing to identify potential misdiagnosis has not been studied.
- We examined HIV misdiagnosis in a cohort of pregnant women diagnosed as HIV-infected based on routine RDT testing at a public sector primary care facility in Cape Town, South Africa and estimated the costs of different testing algorithms.

Methods

- This a retrospective study among a cohort of HIV-infected pregnant women attending routine antenatal services (ANC) between 2013 and 2014 and enrolled in the MCH-ART study, a study evaluating strategies for delivering HIV services to pregnant and postpartum women.
- During the study period, the local HIV diagnosis followed the WHO 2 RDT algorithm by employing SD Bioline HIV-1/2 (Standard Diagnostics, South Korea) for screening and the Alere Determine HIV 1/2 (Alere, Waltham USA) for confirmation.

Confirmation of HIV diagnosis

- As part of the MCH-ART study, all HIV-infected pregnant women who were not on ART or antiretroviral (ARV) prophylaxis per self-report received pre-ART and post-ART VL testing (Abbott RealTime HIV-1). Women with any VL ≥50 copies/ml were considered HIV-infected.
- Any women testing positive by RDT and aviraemic, defined as VL of <50 copies/ml, were investigated further via medical record review and/or enzyme-linked immunosorbent assay (ELISA). The proportion of women found with FP RDT results was calculated.

Costing analysis of misdiagnosis

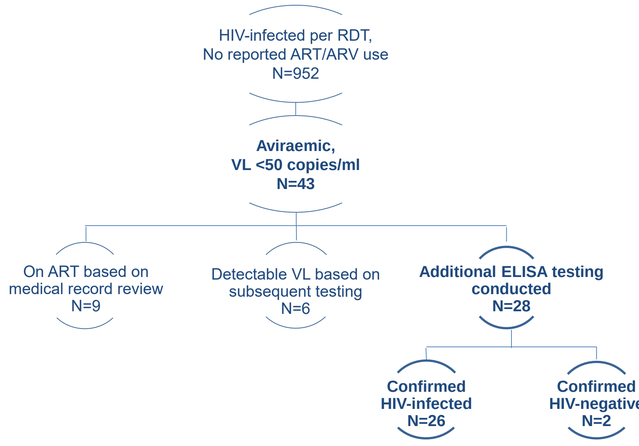
- Using the study FP rate, we estimated the laboratory costs of identifying one erroneous ART initiation using pre-ART VL plus ELISA or other laboratory confirmation strategies, and compared it with using ELISA as a confirmation test alone.

Results

Confirmation of HIV diagnosis

- A total of 952 pregnant women (median age, 27 years; gestational age, 21 weeks) diagnosed as HIV-infected based on routine RDT testing and reporting no current ART/ARV use were included in this analysis.
- In pre-ART VL testing, 43 women (4.5%) were aviraemic with no detectable VL and were investigated as suspected false positive from RDTs (Figure 1).

Figure 1. Confirmation of HIV diagnosis



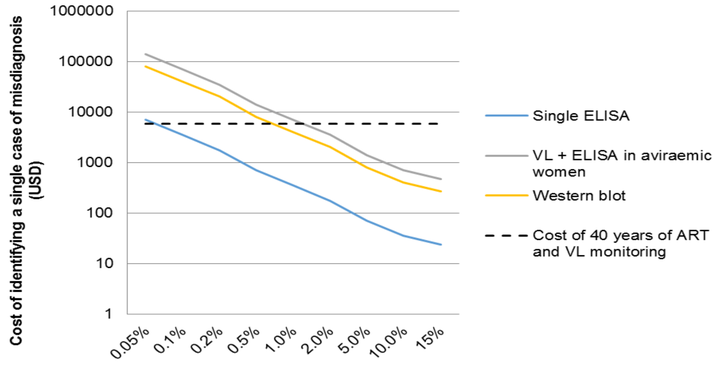
Results *(continued)*

- Of the 43 aviraemic women that were investigated further:
  - 9 women (21%) were subsequently confirmed to be on ART based on review of medical records;
  - 6 women (14%) had detectable virus on subsequent VL measurements;
  - 28 women (65%) underwent additional ELISA testing.
- Of the ELISAs conducted, 2 women were found to be HIV-negative, representing 5% of all aviraemic women (2/43) and 0.2% (2/952) of all women identified as HIV-infected by the public sector health services using RDT.

Costing analysis of misdiagnosis

- We estimate that approximately $9,520 (uncertainty interval, $7,140-$11,900) would be spent on confirmatory pre-ART VL testing, with further ELISA testing for aviraemic women, to identify one patient erroneously initiated on ART.
- By contrast, immediate use of ELISA alone as a confirmatory test would cost $1,666 ($1,428-$1,904) to identify a single patient initiated on ART based on FP RDT results.
- In our model of various FP rates (Figure 2), strategies involving VL and western blot are more expensive than the programmatic cost of misdiagnosis if FP rate is lower than 1%.

Figure 2. Estimated costs to identify a single FP RDT by various testing algorithms



Conclusion

- False positive HIV diagnoses are uncommon in a public sector South African clinic where routine WHO-recommended testing algorithms are used.
- False positive RDT may lead to patients being erroneously initiated on ART, but routine pre-ART VL testing appears inefficient and more costly compared to ELISA only as an approach to confirm infection before ART initiation.

Acknowledgments: Research supported by PEPFAR through NICHD under Cooperative Agreement 1R01HD074558. Additional funding comes from the Elizabeth Glaser Pediatric AIDS Foundation.