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Hybrid HIV testing achieves high coverage of rural East African children

James Ayieko[1], Gabriel Chamie[2], Craig Cohen[2], Tamara Clark[2], Edwin Charlebois[2], Maya Petersen[4], Moses Kamya[3], Diane Havlir[2], Theodore Ruel[2] and the SEARCH team

[1]*Kenya Medical Research Institute,*[2]*University of California, San Francisco, USA;* [3]*Makerere University, Kampala, Uganda;* [4]*University of California, Berkeley, USA*

James Ayieko, MBChB, MPH,
KEMRI, Kenya
Box 614-40100, Kisumu, Kenya
Tel: +254-720-925-262
Email: jimayieko@gmail.com

Background

- WHO now recommends universal testing and treatment for HIV
- Efficient ways to screen African children across communities with varying HIV prevalence are needed
- We sought to determine the effectiveness of a hybrid mobile approach to HIV-testing of children living in different regions of rural East Africa

Methods

- Residents of Uganda and Kenya were enumerated by door-to-door census between 2013-2014 in the SEARCH test-and-treat trial (NCT# 01864603)
- Tested in 2-week multi-disease community health campaigns (CHC) followed by home-based testing (HBT) over 1-2 months
- Achieved 89% coverage of adults (≥15 years old)
- Hybrid mobile HIV testing strategy
  - Screening of all children during multi-disease community health campaigns (CHCs) that also included malaria testing, deworming, vitamin A administration, hypertension and diabetes screening
  - Subsequent targeted home-based testing (HBT) of children determined to be at-risk [= mothers HIV+ or serostatus unknown (HIVunk)]
- Serial HIV antibody testing algorithm using rapid tests per country standard

Analysis

- Included children 2-9 years old
  - Stable residents (lived in study community for ≥6 months of prior year)
  - Stratified by region: southwest Uganda, eastern Uganda, western Kenya
- Described:
  - HIV testing coverage = proportion of at-risk children tested
  - HIV seroprevalence among children
  - Number of children with HIV infection newly diagnosed by SEARCH
- Examined predictors of not testing among at–risk children using Generalized Estimating Equation modelling

Results :

Table 1: Participant characteristics

Stable resident 2-9 year olds		87,700
Female		50%
Age, median (IQR) years		5 (3-7)
Region	SW Uganda	25,295 (29%)
	E Uganda	31,245 (36%)
	Kenya	31,160 (36%)
Maternal serostatus	Negative	57,655 (66%)
	Positive	7,055 (8%)
	Unknown	22,990 (26%)
Parent vital status	Both Alive	80,237(92%)
	Paternal orphans	5,271 (6%)
	Maternal Orphans	1,093 (1.3%)
	Both Dead	803 (0.9%)
	Unknown	295 (0.3%)

Table 2 : Reasons for mother's unknown HIV status

Category	n=	Percentage
Unable to identify mother of child	16,186	70.4%
Orphan, mother not alive	1,897	8.2%
Mother identified but not found on tracking	2,535	11.0%
Mother declined testing of herself	2,208	9.6%
Indeterminate test result	164	0.7%

- 444/819 (54%) of the HIV diagnoses were in children who reported no prior positive test results
- HIV prevalence among children was 0.4% in southwestern Uganda, 0.6% in eastern Uganda and 2.6% in western Kenya

Table 3: HIV testing by site of testing and total coverage

Region	n=	CHC	HBT	Coverage
Southwestern Uganda				
Mother HIV+	1,115	855 (77%)	209 (19%)	**95%**
Mother HIV unk	6,157	4,487 (73%)	1,009 (16%)	**89%**
Eastern Uganda				
Mother HIV+	816	701 (86%)	77 (9%)	**95%**
Mother HIV unk	7,816	5,794 (74%)	1,014 (13%)	**87%**
Western Kenya				
Mother HIV+	5,124	3,585 (70%)	799 (16%)	**85%**
Mother HIV unk	9,017	5,158 (57%)	726 (8%)	**65%**
All at-risk children	**30,045**	20,580 (68%)	3,834 (13%)	**81%**

Table 4: Predictors of NOT testing for HIV

Predictor	Crude		Adjusted	
	OR	95% CI	aOR	95%CI
Region				
E Uganda	1.26	1.12-1.43	1.28	1.14-1.45
W Kenya	3.66	3.30-4.06	3.79	3.40-4.21
SW Uganda	ref		ref	
Age of child (yr)				
2 to 3	0.9	0.84-0.97	0.92	0.85-0.99
4 to 5	0.79	0.74-0.85	0.8	0.75-0.86
6 to 7	0.89	0.83-0.95	0.88	0.82-0.94
8 to 9	ref		ref	
Household Wealth				
Lowest	0.79	0.72-0.86	1.15	1.04-1.26
Middle	0.79	0.73-0.86	0.97	0.89-1.06
Highest	ref		ref	

Table 5: Reasons HIV testing was NOT completed among at-risk children

Category	n= 5,655
Attended CHC, Declined HIV Testing	1,761 (31.1%)
Not found in Tracking	1,401 (24.8%)
Found in Tracking, Declined Testing	2,469 (43.7%)
Indeterminate Result	10 (0.2%)
Incomplete Testing	14 (0.3%)

Conclusions

- **Hybrid mobile testing approach achieved**
  - **81% HIV testing coverage of at-risk children**
  - **Doubled the number of children recognized to be HIV+**
- **In Uganda, HIV testing coverage of children born to HIV+ women reached 95%**
- **As countries seek to achieve universal HIV testing and treatment, the integration of mobile pediatric screening into population-level health programs could offer an efficient means of identifying HIV+ children**

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