Integrating point-of-care technologies into national early infant HIV diagnosis networks: development of a hub-and-spoke model to increase access to HIV testing

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BACKGROUND

• Only half of HIV-exposed infants (HEI) undergo early infant HIV diagnosis (EID), of which only half receive test results (Fig. 1).
• Without early access to treatment, 68% of HIV-positive children die by five years of age, most within the first three months of life.
• Point-of-care (POC) EID can improve the HIV diagnostic cascade and increase the number of HIV-positive infants on treatment.
• Decentralization of prevention of mother-to-child HIV transmission (PMTCT) services across Africa has led to lower demand for EID at any one site, with transport logistics implications for the EID network, and requiring strategic POC EID platform placement to maintain proficiency.
• EGPAF is supporting nine countries in sub-Saharan Africa to integrate POC into national EID systems.

CHALLENGES IN THE EID CASCADE (Fig. 1)

Challenge 1: Poor access to and delays in HIV testing

• 51% of 1.2 million HIV-exposed African children had access to EID testing in 2015 (Fig. 1).
• Most HIV-exposed infants receive their first test at age six months or later (WHO recommends first test at six weeks).

Challenge 2: Delays or no return of test results

• Median time of 30 to 90 days from sample collection to delivery of results.
• Only 50% of children who are tested receive their test results (Fig. 1).

Challenge 3: Poor initiation of HIV-positive infants on treatment

• South Africa study: 10 week delay between diagnosis and initiation of treatment.
• Kenya study: 44% of HIV-positive infants never reached ART clinic.

METHODS

• EGPAF analyzed historical EID testing volumes of 7,979 health care facilities (sites) across nine African countries (Fig. 2).
• Using ≥0.5 EID/day as a minimal testing frequency to sustain proficiency, EGPAF identified only 231 sites with sufficient demand to support placement of a POC instrument (from 7,979 analyzed) (Fig. 2).
• EGPAF analyzed site geographical proximities and built a networked referral model (hub-and-spokes) where the testing site (hub) could receive specimens from nearby, smaller-volume facilities (spokes).
• Hub-and-spoke models constructed in countries utilize: 1) existing transport networks wherever possible; 2) other courier services to complement/expedite; 3) tailored monitoring tools ensuring sample and results tracking; 4) EDTA-whole blood specimens instead of dried blood spots; 5) guidance to ensure timely patient return for results.

RESULTS

• The hub-and-spoke strategy allowed for further increased access to POC EID by identifying an additional 77 hub sites and 1,432 spoke sites, for a total of 1,740 sites accessing POC EID services, of which 308 are testing sites where instruments can be placed (Fig. 2).
• An initial 58 testing sites are serving as pilots between Q4 2016 - Q2 2017 to evaluate the feasibility of hub-and-spoke models for POC EID.
• Preliminary data (Dec. 2016 to April 2017) show samples from spoke sites only (n=315) achieved successful turnaround times of 2.00 days (median) from sample collection to caregiver receipt (Fig. 3).
• All (100%) of POC EID test results were successfully communicated to caregiver visiting spoke sites (Fig. 3).

Figure 1. Gaps in the EID cascade, data from the 2016 UNAIDS report for the 21 priority countries

Figure 2. Use of hub and spoke model to increase the number of sites accessing POC EID testing

Figure 3: Turnaround times from sample collection to result communication observed for spoke sites only in the hub-and-spoke model from 8th December 2016 to 29th April 2017

CONCLUSION

• Use of hub-and-spoke sites to support POC EID testing is a promising model for increasing access to rapid EID results.
• Designing appropriate placement criteria and networks will be key to improve EID access through integration of POC into existing EID networks.
• Close monitoring of sample transport systems, return of results and turnaround times will be key to ensure that hub-and-spoke models contribute to optimizing the coverage and efficiency of EID testing.