

How quickly does external quality assurance to prevent early infant misdiagnosis of HIV save costs in 4 African countries

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ABSTRACT

Background

Decentralised early infant diagnosis (EID) of HIV using point-of-care testing (POCT) has the potential to narrow current testing gaps, which ranges from 13% to 58% across Kenya, South Africa, Uganda and Zimbabwe. However, without external quality assurance (EQA) systems, POCT can lead to potentially high mis-diagnosis rates. EQA programmes aim to assess the provider proficiency in performing POCT and identify critical gaps in the laboratory systems. Problems identified are addressed through corrective actions. We are the first to model the cost–effectiveness of EQA programmes, with application to POCT EID in these countries, representing varying HIV epidemics and health systems.

Methods

Countries were brought together to develop a national EQA programme and estimated costs related to implementing these programmes using a bottom-up costing approach, including start-up and recurrent costs. Optimal POCT performance was estimated using published data on sensitivity (98.5%) and specificity (99.9%), while a suboptimal programme without EQA was conservatively modelled using lower confidence bounds (sensitivity 91.7% and specificity 99.3%). Assuming EQA improves programmes to optimal performance, \$/DALY averted was modelled. Potential for a 1-year EQA programme to avert missed HIV infections, false positive diagnoses and unnecessary treatment costs over 20-years was modelled from observed clinical EID POCT performance from published studies.

Results

The national annual incremental cost of EQA, including corrective action ranged from US\$100,000 in Kenya to \$365,000 in Zimbabwe. Even in optimal testing scenarios, misdiagnosis rates are estimated around 0.3%. Without EQA, the misdiagnosis in the deteriorated programme ranged from 1.4% in Uganda to 1.7% in Zimbabwe, or 179 to 555 infants misdiagnosed annually in Kenya and South Africa, respectively. Adding EQA to POCT EID is cost-saving across all countries, i.e. the costs saved by averting unnecessary treatment exceeds the EQA programme costs.

Conclusion

Though EQA would initially require increased funding, it rapidly provides a positive return on investment by averting the costs of treating HIV-negative infants (potentially for life), and save lives by correctly identifying HIV-positive infants needing treatment. This study is the first to demonstrate the value of funding EQA programmes.