

USING LAB TESTS TO DISTINGUISH RECENT HIV INFECTION



Obtaining more accurate estimates of HIV incidence in national HIV surveys

Following important progress in the global response to HIV and AIDS, the international community has set a new, more ambitious post-2015 target: ending the epidemic by 2030.

Achieving this important goal will require a major increase in efforts and resources. According to UNAIDS, simply maintaining the AIDS response at 2013 levels will result in a rebound of the epidemic, whereas an increase of US\$ 8-12 billion per year from the current levels of approximately US\$ 20 billion will be needed to end the epidemic by 2030.

As we call on international donors and national governments to increase their funding commitments, the pressure is growing to better measure the effectiveness of these investments.

Using a data-driven approach to designing and evaluating interventions is key to assessing the efficacy and efficiency of HIV investments. Until recently, this proved to be a major challenge due to the fundamental difficulty of accurately estimating HIV incidence – i.e. measuring the rate of new infections. Now, new approaches to estimating HIV incidence are available.

These novel methods revolve around the use of laboratory-based tests that can determine whether an HIV infection was contracted within the previous year. Used in the right epidemiological contexts (i.e. countries with a high burden of HIV) and in combination with other data, these tests can provide reliable, actionable information that national governments and public health institutions desperately need in order to optimize their response efforts and their investments. The challenge now is to provide adequate support for the implementation of these tests in the contexts where they are most appropriate.

Know your epidemic: using HIV *incidence* as well as *prevalence*

HIV epidemics are often described in terms of HIV *prevalence*. While prevalence (the number of people living with HIV at a given point in time, whether infected recently or long ago) is important for understanding the overall burden of an epidemic on a population, *incidence* (the rate of *new* HIV infections in a population in a given time period) is also a critically important metric. However, it is less often and less accurately measured.

Knowing the rate of new infections in a population is critical for developing effectively targeted HIV prevention efforts and evaluating their impact in reducing the number of new infections.

Enabling cost-effective and accurate measurement of HIV incidence would allow countries and the global community to:

- Accurately monitor the trajectory of national HIV epidemics and the global HIV pandemic;
- Ensure that the billions invested in HIV prevention are targeting the right populations with the right interventions at the right time;
- Evaluate the effectiveness of HIV prevention and treatment programmes;
- Plan and budget for future health care needs; and
- Help design clinical trials for emerging drugs, treatment regimens and prevention interventions.

HIV incidence is most often estimated using indirect methods based on mathematical models that rely on the use of older prevalence survey data that may not be representative of the wider or current population; such incidence estimates are subject to bias and a wide range of uncertainty. The use of laboratory-based biological assays in national HIV surveys can provide more accurate, representative and timely HIV incidence estimates compared to conventional methods.

HIV incidence assays – challenges and opportunities

Currently available laboratory tests for recent HIV infection are most appropriate for use in high-prevalence settings. However, no currently available test can be used on its own for accurate estimation of incidence. According to WHO, to obtain valid HIV incidence estimates using available tests for recent infection, they must be used in combination with results from other tests (such as HIV viral load) as part of an algorithm. This is because the results of recent infection tests may vary depending on the characteristics of the population being tested – for example, due to HIV subtype differences or the false recent infection classification of people with longstanding infections whose viral load is very low due to successful treatment. Robust incidence estimates using tests for recent infection therefore require the implementation of the appropriate algorithm to be used effectively.

From 2015 onwards, with funding from PEPFAR, nearly 20 countries in sub-Saharan Africa are planning to employ a recent infection test algorithm to estimate HIV incidence as part of their national HIV surveys. This is an exciting and important development for obtaining more accurate HIV incidence data in these countries. Given the complexity and low level of familiarity with newly available tests of recent HIV infection, it is also a development that demands carefully planned support. When incorporating tests of recent infection into a national survey, one critically important aspect of the study design is determining an adequate survey sample size. A common error in using tests of recent infection is surveying too few people, which results in incidence estimates that are not useful. Other areas that require specialized training include the correct and systematic use of recent infection test algorithms within national surveys, as well as appropriate data management and quality control. With the right training and support, recent infection test algorithms can be used effectively to provide accurate estimates of HIV incidence in some countries (i.e. those with higher-incidence populations) and potentially to provide point estimates in high-incidence subpopulations or sub-regions.

FIND's organizational capacity for providing implementation support

Enhancing the use of recent infection test algorithms to optimize HIV incidence estimates

In addition to providing country-specific support for laboratory capacity building to implement recent infection tests, FIND has also identified a need for complementary support at the global level, including:

- Defining the performance characteristics of recent infection tests according to viral subtype and accounting for it in calculation of incidence estimates;
- Driving consensus on key parameters, such as the duration of time following transmission that an infection is considered recent;
- Refining and simplifying guidance on the use of recent infection test algorithms, including more detailed guidance on sampling and survey design to incorporate the use of recent infection tests, and revised guidance and harmonized training for implementers;
- Conducting impact assessments to determine cost effectiveness of recent infection tests; and
- Supporting and enabling assay manufacturers.

FIND is the only non-profit organization whose sole focus is to increase access to diagnostics for diseases of poverty. FIND catalyses the development of needed diagnostic tools, guides their use and policy, and works to accelerate access to new and existing diagnostic solutions. FIND's strengths lie in its ability to remain a neutral player working to fill gaps while providing coordination between assay developers, users and implementers (including health ministries), funders and normative agencies.

FIND has extensive experience in providing country-level diagnostics implementation support and is well-versed in assisting countries in the development of national plans for implementation of new diagnostics, supporting early implementation of new technologies, designing and instituting external quality assurance programmes, and building and strengthening laboratory capacity, as well as quality management and accreditation systems. FIND has a roster of experienced staff and consultants based in several countries, including but not limited to Kenya, Uganda and South Africa, with expertise in laboratory strengthening and training capacity.

In the area of HIV incidence assays, FIND has been working closely with CEPHIA (the Consortium for the Evaluation & Performance of HIV Incidence Assays) and its individual member organizations. As a result, FIND is able to draw on its own expertise and that of others, as needed. This flexibility allows FIND to fill a critical role in the implementation of recent infection tests to optimize HIV incidence estimation, including in:

- Survey planning, such as support for survey size calculations;
- Training for lab staff and/or train-the-trainer models;
- Developing, supporting or implementing external lab quality assurance programs and quality management systems;
- Supporting data analysis and interpretation.

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2. IACPWG. More & better information to tackle HIV epidemics: towards improved HIV incidence assays. *PLoS Med* 8, e1001045, doi:10.1371/journal.pmed.1001045 (2011).

3. Kassarjee, R. *et al.* Independent assessment of candidate HIV incidence assays on specimens in the CEPHIA repository. *AIDS* 28, 2439-2449, doi:10.1097/QAD.0000000000000429 (2014).