Surveillance of Recent HIV Infections: Using a Point-of-Care Recency Test to Rapidly Detect and Respond to Recent Infections

WHAT WAS THE PROBLEM?
As countries make progress towards universal coverage of human immunodeficiency virus (HIV) diagnosis, treatment, and viral suppression of people living with HIV (PLHIV), continuous assessment of a population’s HIV epidemic through ongoing surveillance will remain essential to ensure that interventions are efficiently and effectively targeting those at the highest risk of acquiring or transmitting HIV. Interweaving strategies to locate hard-to-reach groups and the new HIV cases, and rapidly intervening to stop the chain of transmission, can help to control the spread of HIV.

WHAT IS THE EMERGING TECHNOLOGY?
There are two innovations that contribute to the improved surveillance of recent infections: the point-of-care recency test (POC-RT) and a mobile, web-based reporting system.

POC-RT
Point-of-care recency tests (POC-RT), such as the Asante HIV-1 Rapid Recency Assay, combine verification of HIV diagnosis and detection of recent HIV-1 infection in one testing device and is now available as a commercial kit. The test can be completed in 20 minutes, making it a fast way to test individuals. The test has three lines, a Control line (C line), a HIV diagnostic verification line (V line) and third line (Long-term [LT] line), which distinguishes recent infections from long-term infections. The presence of only the control line (C line) indicates HIV-negative status, while the presence of two lines (C and V lines) indicates recent infection, and the presence of all three lines (C, V, and LT lines) indicates long-term infection (Figure 1).

An advantage of the POC-RT in comparison to a conventional laboratory-based test of recent infection (TRI) is that it can be applied in routine HIV testing services (HTS) and the results can be returned to the tested client with appropriate counselling during the visit.

Figure 1. Point-of-care Recency Test (Asante HIV-1 Rapid Recency Assay) Illustration
To facilitate the use of POC-RT results for real-time analysis and data use, the Universidad del Valle de Guatemala (UVG) in partnership with the Ministry of Health (MOH) began piloting a mobile and web-based reporting system (i.e., INCICAR) in Guatemala, Nicaragua, and Honduras. The INCICAR App comprises a data entry module, a notification module through short messaging service (SMS), and a dashboard for data report visualization. Each clinic participating in the INCICAR is provided a mobile phone or tablet with the app installed. Additionally, a web-based module for INCICAR is available for web-based entry using facility computers. VICITS staff are responsible for completing a short questionnaire in the App for each client that undergoes testing with the POC-RT (Figure 2). Data variables include those routinely collected in the HTS encounter, including country, municipality of residence, date of HIV diagnosis, result of the POC-RT, age, gender, and mode of transmission. After completing the questionnaire, data are transmitted to a central server for storage and automated epidemiological analyses that are routinely shared with key stakeholders via SMS, standardized email messages, and a visual dashboard (accessible on a smartphone) for rapid response.

![Login INCICAR App and Questionnaire](image)
Results from INCICAR are linked into a regional data dashboard developed by UVG for automated analysis and visualization of HIV program data, including HIV recency results in routine HTS (Figure 3). Information from this dashboard is updated in real-time and accessible to users with access via smartphone or internet.

The dashboard’s recent infection surveillance module allows data consumers to monitor: 1) the number of recency tests conducted; 2) the number pending VL result for confirmation; 3) final test results by age, sex, location, modes of transmission, and time; and 4) to identify potential clusters of recent transmission on a map.

Figure 3. Dashboard for Monitoring HIV Program Data in Central America

**WHAT WILL BE THE IMPACT?**

Recency testing provides insight into the timeline of an individual’s HIV infection. This information is important to public health because of the ability to use such data for targeted interventions, programmatic shifts, and to strengthen epidemic control. Because results of POC-RT are available in real-time through the mobile reporting system, another advantage of POC-RT is the ability to use results immediately to hone in on hot-spot locations and/or sub-populations with high levels of HIV recency for a rapid public health response to prevent further transmission. Essentially, recency testing is a technology that provides insight and surveillance of new infections and provides public health experts with an opportunity to monitor such new infections and intervene before HIV is transmitted further. In combination with index testing and partner services,
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recency testing offers communities and countries better epidemic control and targeted intervention.

IMPLEMENTATION CASE STUDY: CENTRAL AMERICA REGION (CAR)

In Central America, where the HIV epidemic is concentrated among key populations, the Sentinel Surveillance of Sexually Transmitted Infections Strategy (VICITS) offers routine HIV testing, linkage to care and treatment for HIV-positive clients, index partner testing, and HIV treatment at some clinics. To date the POC-RT has been integrated at select VICITS sites in Guatemala (October 2017), Nicaragua (January 2018), Honduras (February 2018), and El Salvador (May 2018).

Figure 4 (below) illustrates how these data are being used to rapidly identify where recent transmission may be occurring in a country at the regional, national, and sub-national level. These data are reviewed routinely by public health decision makers to identify potential clusters, discuss whether the potential cluster warrants additional investigation, and to plan for a targeted response for facilities, locations, and populations that may require closer follow-up.

By linking to partner services data, the dashboard provides aggregate information on the yield in HIV-positive partners through assisted partner notification services by recency status. In Guatemala, 69% of partners of recent index cases tested HIV-positive in assigned partner testing services compared to 38% of partners of long-term index cases (data not shown). Additionally, the national HIV program is able to monitor rapid ART initiation by the recency status of the HTS client.

Figure 4. Recent infection surveillance module for Guatemala, Nicaragua, and Honduras, October 2017 to May 2018
HOW WILL IT WORK?

COMPONENTS OF THE EMERGING TECHNOLOGY
The POC-RT is applicable to all individuals testing HIV-positive within the national HIV testing algorithm. For targeted implementation, it is particularly applicable among populations at high risk for HIV acquisition and transmission, including adolescent girls and young women in sub-Saharan Africa, key populations, discordant couples, and other priority populations in order to track trends in recent infection and to inform the public health response and prevention strategies. In Central America, the target population is key population clients (men who have sex with men and transgender women), who attend the VICITS sites and test HIV-positive in routine HIV testing provided in these sites.

HEALTH SYSTEMS LEVEL:
This technical approach provides a regional example of how laboratory, surveillance, and programming can interface in a coordinated manner to inform the public health and programmatic response to HIV. In Central America, implementation of the POC-RT in HTS has not disrupted the routine HTS process as it is conducted only on individuals that have a confirmed HIV-positive diagnosis, based on the national HIV testing algorithm. The INCICAR recent infection notification system leverages the existing mHealth infrastructure in the region. In the event of inconsistency in cellular network or internet network, the INCICAR system provides the flexibility of entering data through a mobile app or a web-based module.

INCICAR has been integrated into the MOH platform in Nicaragua, and plans are currently underway for transferring the technology to the Guatemalan MOH. Based on the results of the recent infection surveillance system in VICITS, the MOH in Nicaragua and Guatemala have advocated for the inclusion of HIV recency status as a reportable event in the national HIV case notification system. El Salvador has adapted the Guatemalan protocol for their local context and is currently piloting the integration of HIV recency status into their national HIV case surveillance system.

LOCAL ENVIRONMENT:
With input from key population stakeholders, creative health communication strategies tailored to populations accessing VICITS have been used to promote acceptability and use of the POC-RT, including posting about the availability of new VICITS services for HIV recency testing on Facebook and creative signage and advertisements in clinics to promote uptake of the POC-RT (Figure 5).

INCICAR results are shared in real-time through the UVG data dashboard that is accessible to stakeholders that include MOH representatives from surveillance and laboratory, key population representatives, and health facility implementers.
Figure 5. Facebook post and VICITS advertisements for POC-RT

NATIONAL ENVIRONMENT:
During the planning phase of this activity, the Ministries of Health in the Central America region provided strong leadership in support of POC-RT integration in VICITS HTS sites. Letters of support were written from all National HIV Program Directors. Additionally, MOH facilitated official registration of the POC-RT for public health use, which helped to expedite implementation of the initial pilot in El Salvador and Panama. Based on preliminary results of INCICAR, the MOH in Guatemala and Nicaragua have recommended that HIV recency results be included as a notifiable event for diagnosed HIV cases reported into the national HIV reporting system. The mHealth platform for INCICAR will be transferred to the MOH’s Division of National Health Information System, where the central server for automated analysis will reside, and results will feed directly into the electronic national HIV reporting system for HIV cases. Epidemiological data reports will be generated automatically in the system and a SMS/email will be sent to members of a surveillance technical working group for data review on the dashboard and rapid decision-making on the HIV response.
SCALABILITY

Integration of the POC-RT in routine HTS is being conducted in multiple Central American countries. To date, Guatemala (since mid-October 2017), Nicaragua (since January 2018), Honduras (since February 2018), and El Salvador (since late May 2018) have implemented the assay in VICITS sites. Panama is expected to implement the POC-RT in VICITS sites in August 2018. Additionally, by the third quarter of 2018, the POC-RT is expected to be scaled in Guatemala and Nicaragua by integration in routine laboratory testing for all newly diagnosed HIV cases.

MANAGEMENT AND OVERSIGHT

PEPFAR TEAM INVOLVEMENT AND IMPLEMENTING PARTNER:

The PEPFAR Central America Regional Program worked in collaboration with UVG to plan the implementation of POC-RT in VICITS HTS sites. UVG worked closely with PEPFAR Central America Regional Program and respective Ministries of Health to present the activity to technical commissions of the Council of Health Ministers of Central America for buy-in and sustainability purposes. This engagement also helped to adapt generic protocol to local contexts, schedule a regional sensitization workshop for stakeholders, including the Ministries of Health, and a POC-RT training/workshop to roll out recency testing and scale up in VICITS sites.

The first workshop included key personnel from MoH, implementing partners, laboratory, testing sites and the community. The CDC-Atlanta (HQ) team trained key individuals in recency testing standards of practice (SOP) and participated in data monitoring from the field evaluation. UVG also leveraged its existing mHealth initiative, programmers, communication structure, and strong relationship with the Guatemala MOH to develop a mobile notification module to accommodate the INCICAR App for rapid data processing, storage, analysis, and use.

UVG was heavily involved in translating training material, facilitating and organizing a regional training workshop in Guatemala. UVG also led the development of the mobile notification system for real time tracking and monitoring of results from POC-RT to inform the public health response. Initially, the implementation plan focuses POC-RT in VICITS sites in Guatemala, Nicaragua, Honduras, Panama, and El Salvador with high HIV burden and volume but will be expanded to other testing sites to cover all new diagnoses.

MONITORING:

This solution is being monitored at the site-level to review adherence to POC-RT SOPs, completeness of data collection forms, use and performance of data management tools, and linkage of diagnosed cases to index partner testing. Sites are monitored initially after the conclusion of on-site training for POC-RT and index partner testing, and then routinely monitored thereafter, with on-site technical assistance where needed. In addition, data from the INCICAR notification system are routinely monitored by PEPFAR.
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Central America subject matter experts and implementing partners to review the quality of the data; trends and outcomes in treatment and partners services; quality of data management, analysis, and automated reports from the INCICAR system; and use of HIV recency data for decision making at the central and facility-level.

COMMUNICATIONS:
Regional training workshops organized by the PEPFAR Central America Regional (CAR) program and implementing partners helped improve communication, understanding of the technology, and its potential programmatic and public health impact. Successful workshops, hands-on training, and strong relationships with MOH counterparts have led to deeper engagement and commitment to implementation of the innovation in the region and use of the data for surveillance and programmatic decision-making.

COST:
The total budget for the activity was $162,088 USD. Costs were shared between CDC CAR ($19,600 USD) and the implementing partner UVG ($109,606 USD, plus $32,882 USD in indirect costs).

EFFICIENCY MEASURES:
- Prioritization of index testing for newly diagnosed clients testing recent on the POC-RT.
- Leverage existing mHealth systems to incorporate modules on HIV recency to feed into a central data repository and dashboard for routine analysis and use.
- An economic analysis is planned in late 2018 for all participating countries to assess the cost of the integration of the POC-RT into routine HIV services across VICITS clinics.