Routine HIV Testing
Community of Practice
Session #2

Presenters:
Denver Prevention Training Center
Broward Community & Family Health Centers, Inc.
20 March 2016
Communities of Practice

• Routine HIV Testing CoP Series - Led by faculty from the Denver Prevention Training Center
  • Four 60 minute sessions scheduled for: February 11, March 10, April 14, and May 5 at 1:00 PM Eastern Time

• Invitation to our Electronic Medical Record CoP – March 22, 1:00 – 2:00 PM ET.
Karen Wendel, MD, Director of STD/HIV Prevention and Control
Objectives

• Describe the evolution of HIV testing
• Review time from HIV infection to positive testing by testing method
• Review CDC HIV testing algorithm and rationale
• Discuss limitations of 4th generation point-of-care HIV testing
Evolution of HIV Tests

• **1\textsuperscript{st} generation**
  • Whole viral lysate
  • Detects IgG antibody (Ab)

• **2\textsuperscript{nd} generation**
  • Synthetic peptides
  • Detects IgG Ab

• **3\textsuperscript{rd} generation**
  • Synthetic peptides
  • Detects IgM and IgG Abs

• **4\textsuperscript{th} generation**
  • Detects p24 antigen (Ag) allowing detection of HIV-1 infection before seroconversion
  • Detects IgM and IgG Abs

## HIV Ab/Ag Tests

<table>
<thead>
<tr>
<th></th>
<th>1st generation IgG Ab</th>
<th>2nd generation IgG Ab</th>
<th>3rd generation IgM &amp; IgG Ab</th>
<th>4th generation IgM, IgG Ab, and p24 Ag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab-based testing</td>
<td>Enzyme Immunoassay (EIA), Immuno-fluorescent assay (IFA), GS HIV-1 Western Blot*, Cambridge Biotech HIV-1 Western Blot*</td>
<td>Multispot, Chembio DPP, Avioq HIV-1 Microelisa System*, MedMira Reveal G2 Rapid HIV-1*, Geenius</td>
<td>Bio-Rad GS HIV-1/2 Plus O, Siemens ADVIA Centaur, Enhanced Ortho Vitros</td>
<td>Bio-Rad GS Ag/Ab Combo, Siemens ADVIA Centaur Ag/Ab Combo, Abbott Architect Ag/Ab Combo, BioPlex 2200 HIV Ag/Ab</td>
</tr>
<tr>
<td>CLIA+-waived rapid testing</td>
<td>INSTI HIV-1/HIV-2^, UniGold Recombigen#, Clearview STAT-PAK, Clearview COMPLETE, OraQuick ADVANCE Rapid</td>
<td>INSTI HIV-1/HIV-2^, UniGold Recombigen#</td>
<td>Alere Determine Combo Ag/Ab Rapid Test</td>
<td></td>
</tr>
</tbody>
</table>

- *Test for HIV-1 only; # 3rd generation test functioning as second generation test; ^Test sometimes classified 2nd gen but does detect IgM
- *Clinical Laboratory Improvement Amendments of 1988 (CLIA)

[http://www.biolytical.com/articles/3](http://www.biolytical.com/articles/3)
HIV-1 Nucleic Acid Amplification Tests (NAT)

- Qualitative tests
- Quantitative tests
- Off-label use for HIV diagnosis


HIV Testing: Time to Detection

![Graph showing the timeline of HIV detection with different testing stages](http://www.hivguidelines.org/wp-content/uploads/2015/09/Figure-1.-Window-of-Detection-for-HIV-Based-on-Test-Used.jpg)
CDC algorithm for HIV testing

HIV-1/2 antigen/antibody combination immunoassay

(+) => HIV-1/2 antibody differentiation immunoassay

(-) => Negative for HIV-1 and HIV-2 antibodies and p24 Ag

HIV-1/2 antibody differentiation immunoassay

HIV-1 (+) => HIV-1 antibodies detected
HIV-2 (-) => HIV-1 NAT (+)

HIV-1 (-) => HIV-2 antibodies detected
HIV-2 (+) => HIV-1 NAT (-)

HIV-1 (+) => HIV antibodies detected
HIV-2 (+) => HIV-1 NAT (-) or indeterminate HIV-2 (-)

(+) indicates reactive test result
(-) indicates nonreactive test result
NAT: nucleic acid test

HIV-1 NAT (+) => Acute HIV-1 infection
HIV-1 NAT (-) => Negative for HIV-1
Why Use 4th Generation HIV Tests

- 64 specimens from recently infected individuals
  - 35 samples with (+)HIV RNA/(-)HIV Ab including a 3rd generation HIV test
  - 28/35 (80%) were positive with 4th generation Ag/Ab combo test—Architect

- Test performance on samples from recently infected individuals

<table>
<thead>
<tr>
<th>Assay</th>
<th>% Detected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st or 2nd gen IA</td>
<td>12.5</td>
</tr>
<tr>
<td>OraQuick Advance</td>
<td>17.2</td>
</tr>
<tr>
<td>Western blot</td>
<td>12.5</td>
</tr>
<tr>
<td>Multi-Spot</td>
<td>28.1</td>
</tr>
<tr>
<td>Uni-Gold</td>
<td>34.4</td>
</tr>
<tr>
<td>3rd gen IA</td>
<td>42.2</td>
</tr>
<tr>
<td>4th gen IA</td>
<td>89.1</td>
</tr>
</tbody>
</table>

Gen, generation; IA, Immunoassay

*Acute infection can account for 10%–50% of all new HIV-1 transmissions, especially in persons with multiple sex partners

HIV-1/2 Antibody Differentiation Immunoassay

• Faster lab turn around than the Western blot
• Distinguishes between HIV-1 and HIV-2 more reliably than the Western blot
• Able to detect disease earlier after infection than the Western blot
• Current differentiation assay is Multispot
• New differentiation assay to replace Multispot in December 2016 is Geenius
4th Generation Point-of-Care HIV Testing

- Determine HIV -1/2 Ag/Ab Combo
  - Separate results for HIV p24 antigen and HIV antibody result

http://www.fda.gov/downloads/BiologicsBloodVaccines/BloodBloodProducts/ApprovedProducts/PremarketApprovalsPMAs/UCM364701.pdf
Determine HIV-1/2 Ag/Ab Combo

- Package insert
  - Sensitivity 99.9% with serum, plasma, and whole blood
  - Specificity 98.9-100% with serum, plasma, and whole blood
- In CDC studies on plasma specimens collected during seroconversion, Determine Combo detected infection:
  - 1-2 weeks before other rapid tests
  - 1-3 days before 3rd generation laboratory tests
  - 3-4 days after 4th generation laboratory tests
- There are limited data on the sensitivity of rapid HIV tests when used with whole blood specimens.

Systematic Review: Determine HIV-1/2 Ag/Ab Combo Test

- Review of 4 studies with 17,381 participants
- Studies sites: Australia, Swaziland, United Kingdom, and Malawi
- Analysis of cases of acute infection
  - p24 component evaluated in all 4 studies
    - 26 acute infections were missed—0% sensitivity
    - 35 false positive HIV-1 p24 results—0% positive predictive value
  - Antibody component evaluated in 2 studies
    - In one study, 0 of 3 cases of acute HIV detected
    - In one study, 2 of 8 cases of acute HIV detected

Lewis et al. AIDS 2015, 29:2465-2471
Point-of-Care HIV Testing

• Confirmation of a positive result
  • Standard algorithm

• Data are insufficient to recommend the use of the Determine Combo as the initial assay in the laboratory algorithm.
Case 1: Non-CDC Algorithm Testing

• 35 year old man with a positive point-of-care Determine HIV-1/2 Ag/Ab Combo test result in outreach is sent to a primary care provider.

• Further testing ordered
  • HIV viral load (NAT)
  • CD4 count

• Results
  • HIV viral load: Not detected
  • CD4: 350
Case 1: How do You Proceed

• What do you tell the patient?
  • A. It looks like you don’t have HIV. The point-of-care test was wrong
  • B. We need to do more HIV testing to clarify your HIV status
  • C. I believe you have HIV based on your point-of-care HIV test and cd4 count. Let’s repeat your viral load.

• What do you order next?
  • Repeat HIV viral load
  • Lab-based 4\textsuperscript{th} generation HIV test
  • HIV genotype
  • Repeat HIV point-of-care test
Case 2

• Results:
  • HIV-1/2 Ag/Ab Combo test positive
  • HIV-1/HIV-2 antibody differentiation immunoassay negative
  • HIV-1 viral load 345,000

• Diagnosis
  • A) False negative antibody differentiation immunoassay
  • B) Acute HIV infection
  • C) Chronic HIV infection
Routine HIV Testing
@ BCFHC’s Primary Care Centers

Andrea Brooks
Broward Community & Family Health Centers, Inc.
Partnerships for Care (P4C) Program Lead

March 10, 2016
Key Discussion Topics

- Overview of BCFHC
- Integration of Routine HIV Testing
- Selecting Testing Technologies
- BCFHC’s Next Steps
Who is BCFHC?

- Established in 1998 in Broward County, FL
- **Mission:** “To provide accessible comprehensive high quality primary care services to all persons with dignity and respect.”
- 4 Primary Care Centers
- 1 Dental Center *(Opening May 2016)*
- 88 Employees
- 47% Federally Funded
BCFHC Patients Demographics

Total Patient Population\(^1\): 8,416
PLWHA\(^2\): 327

Patients by Race

- Hawaiian/Pacific Islander, <1%
- Asian, 2%
- Amer. Indian/Alaskan Native, <1%
- More than One Race, <1%
- Black/African American, 49%
- Unreported/Refused, 14%
- White, 34%

Patients by Ethnicity

- Non-Hispanic, 77%
- Hispanic, 22%
- Unreported/Refused, 1%

\(^1\) BCFHC 2015 HRSA Uniform Data Set (UDS) Report.
\(^2\) Patient with HIV diagnosis and at least one visit between 01/01/15 and 12/31/15.
Integration of Routine HIV Testing

- Routine HIV testing introduced by Primary Care Provider
- TO WHO:
  - Any established patients ages 15 – 65 with no documented HIV test or decline
  - Any teens (<15) and older adults (>65) with increased risk for HIV
  - All new health center patients ages 15 – 65
  - All pregnant women with unknown status
Routine HIV Testing Diagram

MA collects and documents testing history and HIV risk data along with other risk information in the H&P form (INTAKE)

PCP introduces test, educates pts, documents consent/decline, and adds test to lab order. If pt. identified as "high risk," provider to task to MCM to schedule risk reduction intervention appt. within 2 weeks (EXAM ROOM)

Lab MA conducts HIV test (blood-based) along with any other labwork. (LAB)

Negative Lab Results

NO RISK Pts. PCP provides results along w/ other labs. No Re-test unless risk identified

HIGH RISK HIV- Pts. PCP tasks MCM for RRI appt. typically within 2 weeks

MCM recommends repeat testing and links to external HIP provider for additional enabling services

Positive Lab Results

PCP reviews results and tasks MA or PSR to contact pt. for F/U appt. Staff schedule next available appt.

At next visit, PCP delivers HIV test results, and orders additional baseline labs

Patient Services Coordinator (PSC) submits HIV+ tests and required info to DOH Surveillance.

PCP refers all new HIV+ pts to Patient Services Coordinator for HIV Services Initial Intake/Assessment

PSC assigns a MCM to all new HIV+ patients.

PSC assigns a CM to patients needing enabling services

HIV SERVICE AREAS

Routine HIV Testing
Prevention Services (for HIV+ or High Risk HIV-)
Linkage to Care
HIV Medical Care (including MCM)
Enabling Services
# Lab Based Test vs. Rapid Test

<table>
<thead>
<tr>
<th>Lab Based (HIV 1/2 antigen / antibody combination immunoassay)</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More acceptable amongst pts when introduced by PCP</td>
<td></td>
<td>• Potential lost to care (pts. don’t return for lab visit)</td>
</tr>
<tr>
<td>• Easier to include with other labs</td>
<td></td>
<td>• Potential delayed entry into care for HIV+</td>
</tr>
<tr>
<td>• CDC recommended testing technology</td>
<td></td>
<td>• Increased lab cost for uninsured pts.</td>
</tr>
<tr>
<td>• No need for additional lab test prior to linking to care</td>
<td></td>
<td>• Increased organizational cost</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rapid Test (Clearview COMPLETE HIV 1/2)</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CLEARVIEW Free of charge for patient and BCFHC</td>
<td></td>
<td>• Additional documentation required</td>
</tr>
<tr>
<td>• Same day result</td>
<td></td>
<td>• Additional training required for “testers”</td>
</tr>
</tbody>
</table>
Lab Based Test vs. Rapid Test

• **Lab based testing for routine testing of patients**
  - Conducted by MA along with other labs
  - Lab costs for insured patients is billed to insurance
  - Lab costs for uninsured/self-pay patients currently covered by grant funding

• **Rapid testing for community members/non-patients**
  - Conducted by Certified C&T Staff (Outreach, some MAs, some Staff Nurses, HIV Care Team Staff)
  - Tests kits provided by State DOH
  - No cost to patients
Additional Training Needed

- All Staff needed additional HIV education and training on routine testing “workflow”
- Rapid Testing Staff (Outreach, Medical Assistants, Staff Nurses HIV Care Team) needed additional HIV specific trainings
  - HIV 500/501 Training through local DOH (which includes completion of in-house HIV C&T practicum)
  - CLEARVIEW Complete Training through local DOH
  - Annual HIV 501 Update through local DOH
- PCP need additional basic HIV care training
- All Staff given access to P4C trainings/webinars
Additional Support Needed

• Expanded documentation options in EHR
  ▪ Wanted to document and track “decliners”
  ▪ Update system to reflect multiple technologies
  ▪ Update workflow
  ▪ Established standing orders for HIV+ patients

• Revise Data Collection Forms
  ▪ Include “risk” questions in Patient H&P form
Routine HIV Testing Outcomes

- **2,040 Routine HIV tests** conducted in 2015
- Monthly Average: **170 tests**
Routine HIV Testing Outcomes

- **35%** of patients aged 15-65 years in need of HIV testing were tested for HIV
Next Steps

✓ Increased compliance with testing workflow across sites

✓ Sustainability planning specific to lab costs for uninsured

✓ HIP for high-risk negatives
WE NEED YOU!
Participate as Health Center co-presenter.
Contact:
Victor Ramirez,
P4C HIV TAC Collaborative Training Coordinator
vramirez@mayatech.com
Thank you for participating in this CoP webinar. We hope that you are able to find the information provided useful as you continue your P4C project. We ask that you take a few moments to complete the feedback survey you will receive in a message following this webinar.
Thank you for participating in today’s CoP webinar

Please email if you have any question(s):

P4CHIVTAC@mayatech.com