Iowa Adopts New HIV Testing Algorithm

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Objectives
At the completion of this webinar, participants will:

• Be familiar with the difference between HIV antibody, antigen, and RNA
• Have a basic understanding of the new HIV testing algorithm that will be used at the State Lab after 11/6/2012
• Understand the new “diagnostic window of detection” and possible test results for serum samples that are tested at the State Lab after 11/6/2012
• Be familiar with the advantages and disadvantages of rapid vs. conventional HIV testing
• Timeframe and processes for submitting specimens to the lab.

Terms
• HIV Testing Algorithm
  – Sequence in which different diagnostic tests are used to arrive at a definitive diagnosis
• Conventional HIV Test Algorithm
  – Blood (serum) sample taken from client via venipuncture; sample sent to laboratory for testing
  – Screening and supplemental tests performed at lab as necessary
  – Result sent back to provider for delivery to client
• Rapid HIV Test Algorithm
  – Blood or oral fluid sample taken from client via finger stick or oral swab; screening test performed onsite
  – Non-reactive result can be shared with client in less than 1 hour
  – Reactive result requires confirmation with conventional test as described above
HIV Antibody Testing

- Antibodies are proteins produced by the immune system to neutralize infections or malignant cells.
- Most people develop detectable HIV antibodies 2-8 weeks after infection (average 25 days).
- Current HIV testing algorithm used at the State Lab:
  - EIA screen (3rd Generation)
  - Confirmed by Western Blot (WB)

1989: CDC recommended two-test algorithm for HIV diagnosis

- T1: HIV-1 EIA
  - Non-reactive
    - Report as HIV Neg.
  - Reactive
    - T2: Western blot (WB) or immunofluorescence assay (IFA)
      - Negative
        - Report as HIV Neg.
      - Indeterminate
        - Report as Indeterminate
      - Positive
        - Report as HIV-1 Pos.
HIV Testing has changed over time

<table>
<thead>
<tr>
<th>Patients with STD's</th>
<th>Current HIV Testing algorithm</th>
<th>All pregnant women</th>
<th>Voluntary screening in all health care settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>1987</td>
<td>1989</td>
<td>1993</td>
</tr>
<tr>
<td>Blood Banks</td>
<td>Inpatients where HIV &gt;1%</td>
<td>More public and private health care settings</td>
<td></td>
</tr>
</tbody>
</table>

HIV Progression and Detectable Response

HIV Antibody

Days since infection

3rd Gen

1st and 2nd Gen

Infection

HIV Progression and Immune Response

Anti retroviral treatment

Clinical latency

Opportunist infections

CD4 count (cells/μl)

Weeks

Years

Days
Progression of HIV Viral Markers

- **p24 Antigen**
  - An antigen is a virus, part of a virus, or a foreign body that triggers the production of antibodies in the body
  - p24 is the antigen on HIV-1 that most commonly provokes an antibody response
  - First marker of HIV-1 infection
  - Can be detected at 2 weeks from infection

HIV Progression and Detectable Response

Slide courtesy of Bernie Branson
4th Generation Ag/Ab Test

• 2 FDA-approved kits available
  – ARCHITECT HIV Ag/Ab Combo (Abbott)
  – GS HIV Ag/Ab Combo EIA (Bio-Rad)
• Detects HIV-1 p24 Ag, HIV-1 and HIV-2 antibodies
• Reactive result:
  – Doesn’t distinguish between Ag and Ab
  – Preliminary positive
  – Supplemental testing required

Why do we need new HIV testing strategies/algorithms?

• Laboratory algorithm established by CDC and APHL (ASTPHLD) in the late 1980’s
  – Over 20 years later remains largely unchanged
• More is known about the disease
  – HIV-1 and HIV-2
  – Window Period
• Evolving technology
  – Tests recently approved by FDA are not included
  – Availability of rapid tests
  – Increased sensitivity of screening assays
    • Western blot and IFA now less sensitive than some screening assays which they are intended to “confirm”

Why do we need new HIV testing strategies/algorithms?

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Diagnostic Window of Detection

- The time from infection to detection
- Varies depending on the test used

Windows of Detection

<table>
<thead>
<tr>
<th>Test</th>
<th>Window of Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Gen:</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Conventional</td>
<td></td>
</tr>
<tr>
<td>3rd Gen:</td>
<td>2-8 weeks (avg. 25 days)</td>
</tr>
<tr>
<td>Conventional</td>
<td></td>
</tr>
<tr>
<td>Rapid HIV Test</td>
<td></td>
</tr>
</tbody>
</table>

Acute HIV Infection

- The risk of transmitting HIV to others is high during acute infection. Therefore, risk reduction measures are especially important during this time.

- Initiating antiretroviral treatment during acute HIV infection may:
  - reduce the HIV viral setpoint and preserve key immune response functions that may slow disease progression
  - reduce the likelihood of transmission to others.

- These advantages may be outweighed by practical concerns about an individual patient’s ability or readiness to take multiple medications.

- Decisions about treatment are individualized. However, with acute infections, initiating care with an Infectious Disease clinician is crucial and very time-sensitive.
**4th Generation HIV Ag/Ab EIA Test**

- Combined antigen/antibody test
- Can detect...
  - p24 antigen
  - HIV-1 antibodies
  - HIV-2 antibodies
- But...cannot tell them apart

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**What are we looking for from these new testing strategies?**

- Resolution of indeterminates
- Ability to confirm HIV-2 infections
- Increased detection of acute infection
- Use of assays as screening or confirmatory/supplemental tests and as part of multi-test algorithms
The New (Conventional) HIV Testing Algorithm: Get to Know It!

Rapid Tests Performed in the Field follow by the New Algorithm

New HIV Testing Algorithm
Step 1

4th Gen EIA (antigen/antibody)
reactive
-
**Multispot HIV Ab Test**

- Supplemental test
  - used after a reactive 4th Gen EIA
- Replaces WB
  - More sensitive and specific than WB
  - Faster and less expensive than WB
- Will differentiate HIV-1 and HIV-2

**New HIV Testing Algorithm**

*Step 2*

1. **4th Gen EIA (antigen/antibody)**
   - reactive
   - -

   **Multispot (antibody)**

   - HIV 1+
   - HIV 2+
   - HIV 1 and 2 -

**What if you get a non-reactive result from the Multispot antibody test?**

**Nucleic Acid Amplification Test for HIV-1 RNA**

- Supplemental test
  - Used after a reactive EIA and a non-reactive Multispot
- Highly sensitive test which can detect the presence of viral RNA

- HIV-1 RNA/NAAT testing can detect acute HIV-1 infection
New HIV Testing Algorithm

Step 3

HIV Progression and Detectable Response

New HIV Testing Algorithm Results

<table>
<thead>
<tr>
<th>Lab Report</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative. HIV-1 p24 antigen, HIV-1 and HIV-2 antibodies not detected.</td>
<td>If client did not have risk in the two weeks before the test or since, the client does not have HIV.</td>
</tr>
<tr>
<td>Positive. HIV-1 antibodies detected.</td>
<td>The client has HIV-1.</td>
</tr>
<tr>
<td>Positive. HIV-2 antibodies detected.</td>
<td>The client has HIV-2.</td>
</tr>
<tr>
<td>Positive. A reactive HIV antigen/antibody test and a positive HIV-1 RNA test indicate acute HIV-1 infection.</td>
<td>The client has HIV-1 and the test result indicates that s/he was recently infected (likely 2-8 weeks before taking the test).</td>
</tr>
<tr>
<td>Negative. HIV antibodies not detected. No detectable HIV-1 RNA. HIV-2 infection cannot be excluded. **</td>
<td>The client does not have HIV-1. The client should be retested in two weeks to rule out possibility of acute HIV-2.</td>
</tr>
</tbody>
</table>
Point of Care Tests in Iowa

OraQuick ADVANCE
If Positive and blood not drawn
SHL performs Oral Fluid Western Blot
If Positive

Clearview Complete HIV 1/2
If Positive and blood drawn
SHL performs Antigen/Antibody follows algorithm
If Positive

What if the Multispot is Negative?

• SHL will send the serum to Florida’s State Public Health Lab for NAAT testing.
  – If NAAT is positive, the patient is HIV positive
  – If NAAT is negative, the patient is HIV negative
HIV Testing Instructions

Submission Requirements:
• Serums, Plasmas and Oral Fluids are accepted for HIV antibody testing.
• Acceptable specimens for HIV Ag/Ab Combo testing include sera and plasma DNA.
• Label tube with patient’s name or unique identifier, date of birth (DOB), and date of collection.
• UNLABELED SPECIMENS WILL NOT BE TESTED.
• A completed HIV Test Request Form must accompany specimen.

Specimen Collection and Handling:
• Blood samples must be collected in a red stopper serum separator (SSS), or a tube without anticoagulant.
• Following collection serum samples may be stored at room temperature for 3 days or 2-8˚C for 7 days.
• 2 ml of serum is the minimum recommended volume for submission.
• Oral fluid samples must be collected in an OraSure collection device. See device for collection instructions.
• OraSure specimens may be stored from 0-4˚C for a maximum of 21 days from the time of collection, including the time for shipping and testing.
• Label specimens, wrap the collection tube in absorbent material, and place into a biohazard bag.

HIV Testing Instructions (continued)

Complete Test Request Form:
• Complete the Test Request Form which includes the following information:
  – Unique patient identifier including the patient’s name if an tear test site, other claims use unique identification number.
  – Must indicate patient’s date of birth.
  – Specimen type and date of collection.
  – Test requested (marked clearly). 
  – Previous negative test result(s) if applicable.
  – Clinician and/or address of the submitter.
• Fill in specimens collection container and match ID on the Test Request Form.

Shipping Instructions:
• Include completed HIV Test Request Form in outside pocket of biohazard bag.
• Roll up the bag and place in mail.
• Fill in address with a sealed self-seal envelope accepted with USPS or equivalent.
• Mail at ambient temperature as soon as possible (first class mail is recommended).
• Mail from specimens in packaging compliant with IATA or US regulations.
• If delay in transport is anticipated, refrigerate specimens until departure.

Contact Information:
• For test results and billing call: 319-355-4579.
• For test forms may be obtained online at: http://www.shl.uiowa.edu/testmenu/clinicaltestmenu.xml
• Any questions should be directed to Testing at 319-355-4579.

Also Remember

• Test must be received in 3 days by SHL or refrigerate for up to 7 days.
Iowa Guidelines

- Use Clearview Rapid
- Architect Ag/Ab Test is performed at SHL and confirms positive Clearview Rapid

For More Information

Proposed HIV Test Algorithms:
http://www.hivtestingconferencearchive.org/hivtesting2010/
Click on "HIV Testing Algorithms: A Status Report"

CDC HIV testing resources:
http://www.cdc.gov/hiv/topics/testing/index.htm
http://www.cdc.gov/dls/waivedtests

APHL resources:
http://www.aphl.org/aphlprograms/infectious/hiv/Pages/default.aspx

NASTAD resources:
http://www.nastad.org/resources.aspx?searchkey=hiv%20prevention

Questions?