HIV – STI Update

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GOALS OF TODAY'S PRESENTATION

• Briefly discuss HIV Virology
• Review CDC testing Recommendations
• To be able to understand the main HIV laboratory tests
• Review of current HIV Epidemiology
• A brief discussion of HIV Basics and OI’s
• To have an increased appreciation of the Management of HIV
• A look at ARVs their sites of action
• Review of Areas for partnering with the HIV Specialist and the Importance of STD management
HIV – human immunodeficiency virus

AIDS- acquired immunodeficiency syndrome
What is the difference between HIV and AIDS?

- **HIV** is a virus that attack and kills immune cells – cells that help you fight off diseases and infections.
- By attacking and killing these immune cells called CD4+ cells, HIV causes **AIDS**.
- CD4 cells are a type of lymphocyte (white blood cell) that can be infected by HIV.
A SLOW VIRUS

• It is a lentivirus, “slow virus” that has a long interval between infection and the onset of serious symptoms.

• HIV works very slowly

• On an average it takes about 10 years for HIV to cause AIDS – even without treatment
First Few Weeks

• Within a few weeks of being infected with HIV, some people develop flu-like symptoms that last for a week or two
• Others have no symptoms at all
• However, even if they feel healthy, HIV is still affecting their bodies
Untreated HIV

• Untreated HIV infection is also associated with many diseases including cardiovascular disease, kidney disease, liver disease, and cancer

• AIDS is the late stage of HIV infection, when a person’s immune system is severely damaged and has difficulty fighting diseases and cancers

• http://www.cdc.gov/hiv/topics
HIV is Transmitted Through:

- blood
- semen
- vaginal secretions
- breast milk
There are NO reports of HIV transmission through saliva, tears, urine, or sweat.
HIV is NOT Transmitted Through:

- toilet seats
- kissing
- eating/drinking
- touching/hugging
- day care, school, church, malls, pools
- mosquito bites
- donating blood
How Is HIV spread?

- Through sex
- Through drug use
- From mother to baby
PERINATAL PREVENTION

• HIV testing should be offered to all women seeking prenatal care (opt out testing).
• Rapid testing for women who present in labor with unknown/undocumented HIV status
• ACTG 076 demonstrated that giving AZT to pregnant HIV + women decreased vertical transmission to 8% (control group had 25%); If mother undetectable, risk down to less than 3%
• ARVs can be administered during and even after labor to newborn to prevent seroconversion
Perinatally Acquired AIDS in the U.S.

No. of Cases

Half-Year of Diagnosis

85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00
HIV and Pregnancy in Our Area

• In southeastern Virginia, about 70 HIV(+) women become pregnant each year.
• Transmission to the child with current antiretrovirals is 0-2% each year.
• Dr. Bonnie Datel in the EVMS Maternal Fetal Medicine Division manages almost all local HIV(+) pregnancies.
• No infected children from HIV (+) pregnant women in her program since 1999.
Where Did HIV Come From?

- Scientists identified the Pan Troglodyte Troglodyte chimpanzee in Africa as the source of HIV1 infection in humans.
- They believe that the chimpanzee version of the immunodeficiency virus (call simian immunodeficiency virus or SIV) most likely was transmitted to humans and mutated into HIV when humans hunted these chimpanzees for meat and came into contact with their infected blood.
- Over decades the virus slowly spread across Africa and later into other parts of the world.

www.cdc.gov/hih/topics/basic/indes.htm
HIV is not the only virus that has spread to humans from animals

• In the news you hear about SARS the respiratory disease that may have spread to humans from civet cats.

• Also many types of flu's are thought to have originated in chickens or birds, or pigs (swine flu).
In the US

• The US first became aware of the clinical entity that would become known as AIDS mid 1981 when there were clustered reports of fatal *Pneumocystis carinii* pneumonia and Kaposi’s sarcoma in young men in California and New York.

• 1982 – it was recognized that AIDS represented the severe end of a clinical spectrum.

• A broad range of constitutional symptoms

• The commonality among these cases was *homosexuality.*
Global HIV Epidemiology, 2009

• Approximately 33/34 million people were infected with HIV worldwide at the end of 2009.
• 2.7 million new infections in 2009, 7400 every day; down from 3 million in 2001.
• 25 million have died since the beginning of the pandemic, 2 million in 2009, down from 2.2 million in 2005.
• HIV is the leading cause of death and disease among women ages 15-49.

Adults and children estimated to be living with HIV, 2011

- **North America**: 1.4 million (1.1-2.0 million)
- **Caribbean**: 230,000 (200,000 – 250,000)
- **Latin America**: 1.4 million (1.1 – 1.7 million)
- **Western & Central Europe**: 900,000 (830,000 – 1 million)
- **Eastern Europe & Central Asia**: 1.4 million (1.1 – 1.8 million)
- **Middle East & North Africa**: 300,000 (250,000 – 360,000)
- **Sub-Saharan Africa**: 23.5 million (22.1 – 24.8 million)
- **South & South-East Asia**: 4.0 million (3.1 million – 5.2 million)
- **East Asia**: 770,000 (560,000 – 1.0 million)
- **South America**: 1.4 million (1.1 – 1.7 million)
- **Caribbean**: 230,000 (200,000 – 250,000)
- **Oceania**: 53,000 (47,000 – 60,000)

Total: 34.0 million (31.4 – 35.9 million)
Percentages of AIDS Cases among Adults and Adolescents by Transmission Category and Year of Diagnosis 1985–2007—United States and Dependent Areas

Note. Data have been adjusted for reporting delays and missing risk-factor information.
*Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
HIV Epidemiology – United States

Number of People living with HIV /AIDS in the U.S. – 1.1 Million

– There were 48,100 new infections in 2009
– Males represent 73% of all cases
– Heterosexual transmission is increasing
  • Number of AIDS cases from heterosexual contact have increased each year from 2000 to 2009
  • 75% of all females diagnosed in 2009 reported heterosexual contact as risk factor
– Those between the ages of 13-29 accounted for 39% of new HIV infections in 2009, the largest share of any age group. Most young people are infected sexually.

Rates of Diagnoses of HIV Infection among Adults and Adolescents, 2010—46 States and 5 U.S. Dependent Areas
N = 48,079

American Samoa 0.0
Guam 2.7
Northern Mariana Islands 0.0
Puerto Rico 33.8
U.S. Virgin Islands 50.4

Total Rate = 19.7
Rates per 100,000 population
- Blue: <10.0
- Light Green: 10.0 – 19.9
- Green: 20.0 – 29.9
- Dark Green: ≥30.0

Note. Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. All displayed data have been statistically adjusted to account for reporting delays, but not for incomplete reporting.
How has epidemiology changed in the USA?

• Increasing cases in:
  ◆ Heterosexual transmission
  ◆ Women
  ◆ Southeast US region and rural areas
  ◆ African Americans
  ◆ Older population

• Substance abuse & STDs important co-factors
   Decreasing pediatric infections
   Decreasing AIDS deaths
HIV Epidemiology-United States

• Percent of people infected with HIV in the U.S. who don’t know they are infected with HIV:

  20 %
For every 5 Virginians diagnosed with HIV infection, approximately:

- 4 are men
- 3 are African American
- 3 live in the Eastern or Northern region
- 3 are men who have sex with other men
- 2 are ages 20 to 34 at diagnosis
HIV Epidemiology in Virginia

Total number of people living with HIV/AIDS in VA as of November 2013 ...... 25,340

- Eastern .......... 7,692
- Central .......... 5,817
- Southwest .... 2,131
- Northern ...... 7,309
- Northwest ..... 1,954
- Unknown ...... 437

Out of the more than one million Americans with HIV:

- 942,000 know they are infected (80%)
- 726,000 were linked to HIV care (62%)
- 480,000 have stayed in HIV care (41%)
- 437,000 are receiving treatment (36%)
- 328,000 have a very low amount of virus in their bodies (28%)
CDC: Differences in Continuum of Care in HIV-Infected Patients

- CDC study shows that only ~ 25% of US patients with HIV have suppressed HIV-1 RNA

Individuals 25-34 yrs of age less engaged in each stage of care compared with all older age groups

WHY IS TESTING DONE?

- Routine Health Screening (2006 Revised CDC Recommendations)
- Perinatal Prevention
- Diagnostic work-up
- Maintain safety of blood supply (1985)
- Occupational Exposure
- Confirm prior test
- Patient request
Revised Recommendations for HIV Testing in Adults and Adolescents- CDC 2006

• HIV screening is recommended for patients ages 13-64 in all health care settings

Objectives

• Increase HIV screening of patients in health care settings
• Foster earlier detection of HIV infection
• Identify and counsel persons with unrecognized HIV and link them to clinical and prevention services
• Further reduce perinatal transmission of HIV in the US
What’s changed with the 2006 recommendations?

• Opt out screening (replaces opt-in) – still voluntary testing, but offered to all regardless of risk
• Screening should be incorporated into general consent for medical care; separate consent not recommended*
• Prevention counseling not required*
• HIV testing for high risk individuals at least once a year
• Routine prenatal screening. Repeat screening in 3rd trimester if area of high incidence/prevalence
When Else Should You Consider Testing for HIV?

- **Clinical triggers**
  - STDs
  - Other infections such as TB, recurrent vaginal candidiasis, community-acquired pneumonia, or varicella zoster
  - Skin conditions such as psoriasis or Seborrheic dermatitis
  - Systemic conditions such as mono, weight loss, Bell’s palsy, generalized Lymphoadenopathy or unexplained focal adenopathy, or pregnancy

- **Historical Triggers**
  - Psychiatric hospitalization
  - Alcohol detoxification or dependence
  - Homelessness
  - Cocaine or crack use
  - Unsafe sex with a partner whose HIV status is unknown or positive


High Risk Individuals

- People who have had an STI
- People who share needles/works
- Men who have sex with men
- Men/women who have unprotected sex with anyone not known to have tested HIV negative
- People who have had a blood transfusion 1978-1985
- People who exchange sex for money/drugs
High Risk Individuals

• Anyone who has had more than one sex partner
• Men/women who have had sex with prostitutes
• Anyone diagnosed with TB
• Anyone who has had exposure to blood of someone at risk for HIV
• People having sex with any of the above
• People with a history of incarceration (?)
Confidential vs. Anonymous
Anonymous vs. Confidential

**ANONYMOUS**

- DO NOT take identifying information
- Free at designated sites
- VDH receives statistical reports only
- Not available in all states

**If positive:**
- Cannot be linked to services until confidential test done

**CONFIDENTIAL**

- DO take identifying information
- Free at designated sites
- VDH receives reports of results by name
- Available at local health departments, clinics and community based organizations throughout the state

**If positive:**
- Can be referred to services immediately

*Virginia HIV/AIDS Resource and Consultation Center*
Testing Technology
HIV Testing

• Tests for presence of antibodies, and HIV directly
• Majority of those infected produce detectable antibody by 4 weeks
• 95% have detectable antibody by 3 months/ 99% by 6 months
• Seroconversion – time when there are enough antibodies to detect with a test
HIV Progression

Amount of HIV

Acute Infection

Asymptomatic

Symptomatic

AIDS

6 months max

~8-10 years average

~10 years without treatment

HIV Antibodies

TIME
Diagnostic Tests

• **ELISA** – initial screening test (sensitivity)

• **Western Blot** – confirmatory testing of ELISA; detects antibodies to HIV proteins (Specificity)

• **Indirect Immunofluorescence Assay (IFA)** - (Specificity)

• According to CDC, the combined accuracy of two tests is over 99%
False Positive Rate on ELISA can be as high as 2% so confirmation is crucial.
Western Blot

• FDA considers a Western Blot positive if antibodies exist to 2 of the following HIV-1 antigens: p24 or gp41 and gp120 or gp160

• It is not a statement about his/her general health nor does it indicate when or if a person will develop AIDS.
Gold Standard Testing Algorithm

Patient Serum sent for ELISA

- **Negative**: Repeat testing according to risk factors
  - **Negative**: Repeat testing according to risk factors
  - **Indeterminate**: Repeat testing in 3 months or consider a different test
  - **Positive**: Perform Western Blot
    - **Positive**: Inform client and alter clinical care appropriately
- **Positive**: Repeat ELISA on same specimen
4th Generation HIV Testing

- 4th Generation HIV diagnostic assay approved – Architect HIV Ag/Ab Combo Assay – FDA approved
- It’s specific for the detection of the HIV-p24 antigen, antibodies to HIV-1 groups M and O, as well as antibodies to HIV-2
- Reduces the window period to approx. 16 days (7 days earlier than 3rd generation tests)

www.fda.gov/ForConsumers/ByAudience/ForPatientAdvocates/HIVandAIDSactivities...
New HIV Diagnostic Testing Algorithm

VDH Makes Changes

- On Oct 1 2013 – Bio-Rad HIV Combo Ag/Ab EIA (4th generation test) became available from DCLS
- In November 2013, DCLS eliminated the use of the Western Blot for the confirmation of HIV-1. Replaced by the Multispot
- Specimen – 10ml whole blood or 5 ml serum
Reasons for Indeterminate Test Results

- Individual in the process of seroconverting
- Late stage HIV infection (loss of core antibody)
- Cross reacting nonspecific antibodies – collagen vascular disease, autoimmune diseases, lymphoma, MS, pregnancy
- HIV vaccine recipients
- Infection with O strain or HIV-2
- Technical or clerical error
Additional Testing Options for Indeterminate Results

• **P 24 Antigen test**
  - FDA approved for HIV diagnosis.
  - P24 antigen is sometimes used as an alternative for HIV RNA (viral load) test to detect infection due to reduced cost. Specificity 100%, sensitivity is 90%
  - The anti P24 antibody is usually the first antibody to show up/develop

• **HIV DNA PCR** – Qualitative test
  - 99% sensitivity