Objectives

(1) Review the diagnosis and treatment of HIV and AIDS
(2) Discuss utilization of Pre-Exposure Prophylaxis (PrEP) therapy for the prevention of the spread of HIV
(3) Linking HIV positive patients to care and other assistance to improve HIV outcomes in WV
History of HIV

• HIV was discovered in 1981 following a CDC report, the Morbidity and Mortality Weekly Report (MMWR), describing five cases of *Pneumocystis Carinii* Pneumonia (PCP)
• This was the first published report about an illness that would become known as acquired immunodeficiency syndrome (AIDS)
• Shortly after this first report, additional cases of a life-threatening opportunistic infection (OI), a malignancy known as Kaposi’s Sarcoma (KS), was identified
• From this, the Task Force for Kaposi’s Sarcoma and Opportunistic Infection was started by the Centers for Disease Control and Prevention (CDC)
• By the end of 1981, 159 cases of KS and OIs had been reported in the United States, with the earliest cases identified in 1978
HIV Overview

• Significant advances in antiretroviral therapy have been made since the introduction of zidovudine (AZT) in 1987

• With the advent of active antiretroviral therapy (HAART), HIV-1 infection is now manageable as a chronic disease in patients who have access to medication and who achieve durable virologic suppression

• As therapies have become more aggressive, they have been more effective, although survival with HIV infection is not yet equivalent to that in uninfected people
Changes in Life Expectancy for HIV Patients

Source: https://emedicine.medscape.com/article/1533218
• An estimated 33 million people are infected with HIV worldwide
• In the United States, more than 1.2 million have HIV infection
• Almost 1 in 5 are unaware of their infection
• That is an estimated 240,000 don’t know they are infected with HIV
• The estimated incidence of HIV in the United States has remained stable in recent years, with about 50,000 new infections occurring each year

Source: https://emedicine.medscape.com/article/1533218-overview
Source: https://www.cdc.gov/vitalsigns/HIVtesting/index
2015 Rates of HIV Diagnoses in the US

Rates of HIV Diagnoses Among Adults and Adolescents in the US in 2015, by State


Source: https://www.cdc.gov/hiv/statistics/overview/geographicdistribution.html
HIV Care in the United States

For every 100 people living with HIV:
- 80 are aware of their infection
- 62 are linked to HIV care
- 41 stay in HIV care
- 36 get antiretroviral therapy
- 28 have a very low amount of virus in their body

Route to healthy living with HIV and preventing new infections:
1. Get an HIV test
2. If you have HIV, get prevention counseling and medical care
3. Stay in medical care
4. Take and stay on medicine to lower the amount of HIV in the body

Lower amount of virus means:
- Better health
- Longer life
- Fewer new infections
- Helping to stop HIV in the US

Source: https://www.cdc.gov/vitalsigns/HIVtesting/index
Definition of HIV

Human Immunodeficiency Virus (HIV)

• Retrovirus that infects primarily CD4 - T helper cells as well as coreceptors belonging to the chemokine receptor family (CCR5 or CXCR4) and causes AIDS

• Depletion of these CD4 cells causes progressive immunologic decline
HIV Replication Cycle

- HIV enters macrophages and CD4+ T cells by the adsorption of glycoproteins on its surface to receptors on the target cell followed by fusion with the viral envelope with the cell membrane and then release of the HIV capsid into the cell.

- Entry requires receptors and coreceptors (CCR5 and CXCR4).

- This interacts with the protein in the HIV envelope.
HIV Replication Cycle (Cont.)

• GP120 and GP41 (glycoproteins) are required for the attachment of the HIV molecule

• HIV binds to the CD4 receptor and coreceptor

• This confirms the change in GP120

• GP41 unfolds and inserts into the cell, then refolds pulling the cell to fuse the membrane, to prepare the cell for insertion of the virus
HIV Replication Cycle (Cont.)

• The Capsid enters the CD4 cell with 2 strands of RNA and 3 enzymes

  (1) Reverse Transcriptase
  (2) Integrase
  (3) Protease
REVERSE TRANSCRIPTASE

- After the viral capsid enters the cell, the enzyme called reverse transcriptase separates RNA

- Causes the reverse transcription of RNA

- Makes the RNA/DNA double helix
INTEGRASE

• Cleaves dinucleotides to 3' ends (makes them sticky) to integrate to the DNA

PROTEASE

• Cleaves longer proteins to shorter proteins (this is crucial for viruses to become infectious)

• This allows the virus to mature
THE GENOME NOW HAS HIV

- Cell converts pro-viral DNA to RNA. Then the Viral messenger RNA synthesizes new viral building blocks.

HIV REPLICATES BILLIONS OF VIRUSES PER DAY

- Entry to the cell begins through entry through the envelope (GP 160 spike) and the CD4 cell

- The core proteins completed for the new capsid that matures and is integrated into new viral cells that mature, are released, and infect new cells

- Then the cycle repeats, again and again
HIV Replication Cycle

Source: https://images/HIV+replication+cycle+selectedIndex
Definition of AIDS

• Acquired Immunodeficiency syndrome (AIDS)
• Syndrome caused by infection with HIV
• Diagnosis of AIDS is made on the basis of:
  (1) CD4 cell count < 200, or

(2) CD4 < 14 %

(3) Development of one of the 25 AIDS defining conditions or opportunistic infections
HIV Progression to AIDS

Source: https://upload.wikimedia.org/commons/a/a4/Hiv-timecourse.
Six classes of antiretroviral agents currently exist:

1. Nucleoside reverse transcriptase inhibitors (NRTIs)
2. Non-nucleoside reverse transcriptase inhibitors (NNRTIs)
3. Protease inhibitors (PIs)
4. Integrase inhibitors (INSTIs)
5. Fusion inhibitors (FIs)
6. Chemokine receptor antagonists (CCR5 antagonists)
HAART Medication Mechanism of Action

Source: http://www.nature.com/nrmicro/journal/v11/n12/images/nrmicro3132-f2.jpg
Pre-Exposure Prophylaxis for HIV

• Pre-Exposure Prophylaxis: PrEP Therapy

• PrEP is an HIV prevention strategy in which HIV negative people take anti-HIV medications before coming in contact with HIV to reduce their risk of becoming infected

• Additional information and CDC recommendations: https://www.cdc.gov/hiv/risk/prep
HIV Medications: PrEP Therapy

• Truvada®: Contains 2 medications (tenofovir and emtricitabine) that are used in combination to treat HIV

• When someone is exposed to HIV through intercourse or IV drug use, these medications can work to keep them from establishing a permanent infection
Effectiveness of PrEP Therapy

- 92% effective for men who have sex with men (MSM) when taken correctly, daily
- 90% effective among heterosexual men and women in HIV-discordant couples
- 73.5% effective among persons who inject drugs
Information Regarding PrEP

Risk Factors for HIV

- Injection drug users (IDU)
- Accidental needle stick exposure
- Persons with multiple sex partners
- Persons diagnosed with other STDs (co-infection)
- MSM
Who Should be Tested for HIV?

- Everyone ages 15-65 should be tested for HIV once
- Women planning to become pregnant, or if they become pregnant, test as early as possible
- MSM population may benefit from testing more frequently, every 6 months to a year
- Anyone with known risk factors

HIV Testing

- Rapid testing for HIV-specific proteins in blood or saliva
- Western Blot testing to ensure the rapid is accurate

Source: https://files.hiv.gov/s3fs-public/preventioncontinuumchart
# West Virginia Reportable Infectious Diseases

## Facilities and Providers (WV Code 16-3-1; 64CSR7)

Reporting of the following communicable diseases is required by law as follows:

<table>
<thead>
<tr>
<th>Category I</th>
<th>Report suspect or confirmed cases immediately to the Local Health Department</th>
<th>Category II</th>
<th>Report within 24 hours to the Local Health Department</th>
<th>Category III</th>
<th>Report within 72 hours to the Local Health Department</th>
<th>Category IV</th>
<th>Report within 1 week to the Local Health Department</th>
<th>Category V</th>
<th>Report within 1 week to the state health department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td></td>
<td>Animal bites</td>
<td></td>
<td>Campylobacteriosis</td>
<td></td>
<td>Acute flaccid myelitis (AFM)</td>
<td></td>
<td>AIDS</td>
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<tr>
<td>Botulism</td>
<td></td>
<td>Brucellosis</td>
<td></td>
<td>Cryptosporidiosis</td>
<td></td>
<td>Anaplasmosis</td>
<td></td>
<td>Chancreoid</td>
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<tr>
<td>Botulism</td>
<td></td>
<td>Cholera</td>
<td></td>
<td>Cyclospora</td>
<td></td>
<td>Arboviral infection</td>
<td></td>
<td>Chlamydia</td>
<td></td>
</tr>
<tr>
<td>Foodborne Outbreak</td>
<td></td>
<td>Dengue fever</td>
<td></td>
<td>Giardiasis</td>
<td></td>
<td>Babesiosis</td>
<td></td>
<td>Gonococcal conjunctivitis of the newborn</td>
<td></td>
</tr>
<tr>
<td>Intentional exposure to an infectious agent or biological toxin</td>
<td></td>
<td>Diphtheria</td>
<td></td>
<td>Listeriosis</td>
<td></td>
<td>Chickenpox (numerical totals only)</td>
<td></td>
<td>(within 24 hours)</td>
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<tr>
<td>Middle East respiratory syndrome coronavirus (MERS-CoV)</td>
<td></td>
<td>Hemophilus influenzae, invasive disease</td>
<td>Hemolytic Uremic Syndrome, postdiarrheal</td>
<td>Listeriosis</td>
<td></td>
<td>Ehrlichiosis</td>
<td></td>
<td>Gonococcal disease, drug resistant (within 24 hours)</td>
<td></td>
</tr>
<tr>
<td>Novel influenza infection, animal or human</td>
<td></td>
<td>Hepatitis A, acute</td>
<td></td>
<td>Salmonellosis (except Typhoid fever)</td>
<td></td>
<td>Hantavirus pulmonary syndrome</td>
<td></td>
<td>Gonococcal disease, all other</td>
<td></td>
</tr>
<tr>
<td>Orthopox infection, including smallpox and monkeypox</td>
<td></td>
<td>Hepatitis B, acute, chronic or perinatal</td>
<td></td>
<td>Shigellosis</td>
<td></td>
<td>Influenza-related death in an individual less than 18 years of age</td>
<td></td>
<td>Hepatitis C, acute</td>
<td></td>
</tr>
<tr>
<td>Outbreak or cluster of any illness or condition</td>
<td></td>
<td>Hepatitis D</td>
<td></td>
<td>Typhoid fever</td>
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<td>Legionellosis</td>
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<td>HIV</td>
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<tr>
<td>Plague</td>
<td></td>
<td>Meningococcal disease, invasive</td>
<td></td>
<td>(Salmonella typhi)</td>
<td></td>
<td>Leptospirosis</td>
<td></td>
<td>Pelvic inflammatory disease</td>
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<tr>
<td>Rubella</td>
<td></td>
<td>Mumps, acute infection</td>
<td></td>
<td>Yellow fever</td>
<td></td>
<td>Lyme disease</td>
<td></td>
<td>Syphilis (late)</td>
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<tr>
<td>Rubella, congenital syndrome</td>
<td></td>
<td>Pertussis (whooping cough)</td>
<td></td>
<td>Any other unusual condition or emerging infectious disease</td>
<td></td>
<td>Malaria</td>
<td></td>
<td>Syphilis, primary, secondary or early latent</td>
<td>(less than 1 year duration) or congenital</td>
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<tr>
<td>Rubella (Measles)</td>
<td></td>
<td>Poliomyelitis</td>
<td></td>
<td></td>
<td>In any setting including fever viruses such as Ebola and Marburg and arenaviruses such as Lassa fever</td>
<td>Parotitis</td>
<td></td>
<td>(within 24 hours)</td>
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<tr>
<td>SARS coronavirus infection</td>
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<td>Q-fever (Costello Burnet)</td>
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<td></td>
<td>Respiratory syncytial virus (RSV) – related death in an individual &lt; 5 years of age</td>
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<tr>
<td>Smallpox</td>
<td></td>
<td>Rabies, human or animal</td>
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<td>Spotted fever rickettsiosis</td>
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<tr>
<td>Tularemia</td>
<td></td>
<td>Shiga toxin-producing Escherichia coli (STEC)</td>
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<td>Streptococcal disease, invasive Group B</td>
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<tr>
<td>Viral hemorrhagic fever</td>
<td></td>
<td>Staphylococcus aureus with glycopeptide-intermediate (GISA/VISA) or glycopeptide-resistant (GRSA/VRSA) susceptibility</td>
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<td></td>
<td></td>
<td>Streptococcal toxic shock syndrome</td>
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<tr>
<td>Waterborne outbreak</td>
<td></td>
<td>Tuberculosis; all forms</td>
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<td></td>
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<td>Streptococcus pneumoniae, invasive</td>
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<td>Viral hemorrhagic fever</td>
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<td>Typhoid fever (Salmonella typhi)</td>
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<td></td>
<td>Tetanus</td>
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<td>Any other unusual condition or emerging infectious disease</td>
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<td></td>
<td>Tuberculosis, latent infection</td>
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</tbody>
</table>

WV Health Alert #139 – Increase in HIV

- Issued August 11, 2017
Scott County, Indiana
Scott County, Indiana (Cont.)

- CDC – released MMWR May 1, 2015
- Community Outbreak of HIV Infection Linked to Injection Drug Use of Oxymorphone – Indiana
- On January 23, 2015, the Indiana State Department of Health (ISDH) began an ongoing investigation of an outbreak of HIV after specialists reported 11 confirmed cases in South-East Indiana
- Historically, less than 5 cases were reported per year
- As of April 21, 2015, there were 135 HIV positive (HIV+) persons linked to syringe-sharing
Scott County, Indiana (Cont.)

- Age range of the 135 patients is 18-57 years (mean 35 years, median 32 years)
- Small number of pregnant women were identified as newly HIV+
- Due to immediate administration of antiretroviral therapy, no infants tested positive for HIV
- Drug of choice for majority of IDU in this group was oxymorphone
- Coinfection with Hepatitis C virus diagnosed in 114 of these patients (84.4%)
Scott County, Indiana (Cont.)

- Multigenerational drug use (3-generations)
- Like many other communities, there was high unemployment (8.9%)
- High proportion of adults who did not complete high school (21.3%)
- Substantial poverty (19%)
- Scott County consistently ranks among the lowest in the state for health indicators and life expectancy
County-level Vulnerability to Rapid Dissemination of HIV/HCV Infection Among Persons Who Inject Drugs

Goals for Healthcare Providers

• Be aware of your patient’s risk factors for HIV
• Test for HIV
• Provide counseling with HIV testing to reduce risk factors and the transmission of HIV
• Seek early treatment for those who are HIV +
• Utilize resources available for you and your patients
• Contact the West Virginia Office of Epidemiology & Prevention Services: Division of STD, HIV, Hepatitis

http://www.dhhr.wv.gov/oeps/std-hiv-hep

or

Toll Free Hotline: 800-642-8244
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