ACTHIV 2018: A State-of-the-Science Conference for Frontline Health Professionals
HIV Epidemiology in the United States: Where is the Epidemic Going?

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Learning Objectives:

1. Characterize patients at greatest risk of HIV infection the United States.

1. Apply knowledge about the emerging epidemiology of HIV infection in the US to address preventable and treatable comorbidities and reduce new HIV infections.
Stage 3 (AIDS) Classifications and Deaths of Persons with Diagnosed HIV Infection Ever Classified as Stage 3 (AIDS), among Adults and Adolescents, 1985–2015 United States and 6 Dependent Areas

Note. Deaths of persons with HIV infection, stage 3 (AIDS) may be due to any cause.
Rate of Death among Persons Living with Diagnosed HIV Infection Ever Classified as Stage 3 (AIDS) Median Age at Death due to HIV Infection United States, 1987–2013

Death Rate, Ever AIDS

- 382 per 100,000 in 1987
- 20 per 100,000 in 2013

Age at Death, HIV Infection

- 36 years in 1987
- 51 years in 2013

Note: For comparison with data for 1999 and later years, data for 1987–1998 were modified to account for ICD-10 rules instead of ICD-9 rules.


Note: For comparison with data for 1999 and later years, data for 1987–1998 were modified to account for ICD-10 rules instead of ICD-9 rules.
Stage 3 (AIDS) Classifications and Deaths of Persons with Diagnosed HIV Infection Ever Classified as Stage 3 (AIDS), among Adults and Adolescents, 1985–2015

United States and 6 Dependent Areas

Note. Deaths of persons with HIV infection, stage 3 (AIDS) may be due to any cause.
HIV Diagnoses Age 13 Years or Older, U.S. Only

HIV Diagnoses Age 13 Years or Older, U.S. Only

Number of Diagnoses/Deaths

Source: CDC. [https://www.cdc.gov/nchhstp/atlas/index.htm](https://www.cdc.gov/nchhstp/atlas/index.htm)
New HIV Diagnoses by Age, 2016, U.S. and Dependent Area

Estimated Diagnoses of HIV Infection

<table>
<thead>
<tr>
<th>Age, years</th>
<th>Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;13</td>
<td>122</td>
</tr>
<tr>
<td>13-14</td>
<td>23</td>
</tr>
<tr>
<td>15-19</td>
<td>1,665</td>
</tr>
<tr>
<td>20-24</td>
<td>6,848</td>
</tr>
<tr>
<td>25-29</td>
<td>8,030</td>
</tr>
<tr>
<td>30-34</td>
<td>5,766</td>
</tr>
<tr>
<td>35-39</td>
<td>4,312</td>
</tr>
<tr>
<td>40-44</td>
<td>3,391</td>
</tr>
<tr>
<td>45-49</td>
<td>3,214</td>
</tr>
<tr>
<td>50-54</td>
<td>3,009</td>
</tr>
<tr>
<td>55-60</td>
<td>1,971</td>
</tr>
<tr>
<td>60-64</td>
<td>1,114</td>
</tr>
<tr>
<td>&gt;65</td>
<td>859</td>
</tr>
</tbody>
</table>

Total 40,324

New HIV Diagnoses by Age, 2016, U.S. and Dependent Area

New HIV Diagnoses by Race/Ethnicity – U.S. and Dependent Territories (2016, n = 40,324)

- African Americans: 44%
- Hispanics/Latinos: 26%
- Whites: 26%
- Asians: 3%
- Native Hawaiian/Other Pacific Islanders: <1%
- American Indiana/Alaskan Natives: <1%
- Multiple races: 1%

General Population:
- Whites: 77%
- Other races: 6%

https://www.census.gov/quickfacts/fact/table/US/PST045216
New HIV Diagnoses by Transmission Risk – U.S. and Dependent Territories (2016, n = 40,324)

- Male-to-Male Sexual Contact: 67%
- Heterosexual Contact: 24%
- Injection Drug Use: 6%
- Male-to-Male Sexual Contact and Injection Drug Use: 3%

Estimated New HIV Diagnoses in the U.S. and Dependent Territories for the Most-Affected Subpopulations, 2016

- Black MSM: 10,266
- Hispanic/Latino MSM: 7,689
- White MSM: 7,392
- Black women, heterosexual contact: 4,189
- Black men, heterosexual contact: 1,927
- Hispanic/Latino women, heterosexual contact: 1,121
- White women, heterosexual contact: 1,033

Estimated New HIV Diagnoses in the U.S. and Dependent Territories for the Most-Affected Subpopulations, 2016

- Black MSM: 10,266 (5%* compared with 2011)
- Hispanic/Latino MSM: 7,689 (16%)
- White MSM: 7,392 (10%)
- Black women, heterosexual contact: 4,189 (10%)
- Black men, heterosexual contact: 1,927
- Hispanic/Latino women, heterosexual contact: 1,121
- White women heterosexual contact: 1,033


* Compared with 2011
Estimated Lifetime Risk of HIV Infection Based on CDC Surveillance Data 2010-2014

- Black MSM: 1 in 2
- Hispanic/Latino MSM: 1 in 5
- White MSM: 1 in 11

Diagnoses of HIV Infection Among men Who Have Sex With Men, By Age Group, 2011-2016 – U.S. and Dependent Areas

HIV by U.S. Jurisdiction

- In 2014, five states accounted for about half of persons living with HIV, undiagnosed infections and new HIV infections.

- In 2014, states located in the South accounted for
  - 45% of persons living with HIV
  - 50% of undiagnosed HIV infections
  - 51% of annual HIV infections
  - ...but include only 38% of the general population

Question #1

What percentage of deaths among Americans with HIV occur in the South?

1. 25%
2. 50%
3. 75%
4. 90%
What percentage of deaths among Americans with HIV occur in the South?

- 25%: 6%
- 50%: 76%
- 75%: 17%
- 90%: 1%

Source: https://api.cvent.com/polling/v1/api/polls/sp-4qq3gv
Trends in the Percentage Distribution of Deaths due to HIV Infection by Geographic Region, United States, 1987-2014

Note. For comparison with data for 1999 and later years, data for 1987–1998 were modified to account for ICD-10 rules instead of ICD-9 rules.
With ART HIV Infection in 2018 is a Manageable Chronic Disease

- ART is life-long treatment that requires life-long care to suppress viral replication
  - Facilitated by multiple single-tablet once daily regimens with fewer side effects
Expected Survival After Diagnosis at Age 20

End of mono/dual era  Highly effective combination therapy era

<table>
<thead>
<tr>
<th>Year Period</th>
<th>Potential Survival Gains (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-1996</td>
<td>+8 years</td>
</tr>
<tr>
<td>2000-2002</td>
<td>+36 years</td>
</tr>
<tr>
<td>2003-2006</td>
<td>+45 years</td>
</tr>
<tr>
<td>2006-2007</td>
<td>+51 years</td>
</tr>
<tr>
<td>2010</td>
<td>+55 years</td>
</tr>
<tr>
<td></td>
<td>+60 years (Negative)</td>
</tr>
</tbody>
</table>

Antiretroviral Therapy Has Improved Immensely

• Simplified regimens (“one pill once a day”)
• More potent
• Fewer side effects

AIDSinfo: https://aidsinfo.nih.gov/drugs
AIDS InfoNet: www.aidsinfonet.org, Fact Sheet 42
Effective Treatment Prevents Sexual HIV Transmission

HPTN 052 → 1,763 heterosexual mixed HIV-status couples:
  o 10,381 person-years, no genetically linked infections

PARTNER → 888 heterosexual and male homosexual mixed HIV-status couples:
  o ~58,000 condomless sex acts, no genetically linked infections

OPPONITES ATTRACT → 358 male homosexual mixed HIV-status couples:
  o ~16,800 condomless sex acts, no genetically linked infections

~75,000 condomless acts of vaginal and anal intercourse
over > 1,500 couple years of observation

• Effectiveness to prevent HIV transmission for other transmission routes not studied
• Expect it would be very high and possibly comparable

Effective Treatment Prevents Sexual HIV Transmission

UNDETECTABLE = UNTRANSMITTABLE

People who take ART daily as prescribed and achieve and maintain an undetectable viral load have effectively no risk of sexually transmitting the virus to an HIV-negative partner.

September, 2017

Current Treatment Recommendations

• Since 2015, all major U.S. and other international HIV treatment guidelines recommend offering ART as close to diagnosis as feasible
  o To reduce morbidity and mortality (illness and death)
  o To reduce HIV transmission
With ART HIV Infection in 2018 is a Manageable Chronic Disease

• ART is life-long treatment that requires life-long care to suppress viral replication
  o Facilitated by multiple single-tablet once daily regimens with fewer side effects

• Getting suppressed requires getting diagnosed and into ongoing care
  o HIV care continuum is key focus
Question #2

What percentage of Americans diagnosed with HIV have an effectively suppressed viral load?

1. 25%
2. 50%
3. 75%
4. 90%
What percentage of Americans diagnosed with HIV have an effectively suppressed viral load?

- 25%: 22%
- 50%: 42%
- 75%: 34%
- 90%: 1%

Source: https://api.cvent.com/polling/v1/api/polls/sp207w8u
HIV in the United States

Not all people with HIV are getting the care they need.

1.1 million people living with HIV in the US in 2014

85% diagnosed

62% received care

48% retained in care*

49% virally suppressed**

* Had 2 tests at least 3 months apart to measure level of virus in the body. ** Virus at low enough level to stay healthy and reduce transmission risk. Based on most recent test.

Many People at Risk for HIV Not Tested Annually

7 in 10 people at high risk who weren’t tested for HIV in the past year saw a healthcare provider during that time. More than 75% of them weren’t offered a test.

In 2015, nearly 40,000 people in the US received an HIV diagnosis.

- 1 in 2 had been living with HIV 3 years or more
- 1 in 4 had been living with HIV 7 years or more
- 1 in 5 already had the most advanced stage of HIV (AIDS)

Source: Dailey et al., MMWR Morb Mortal Weekly Rep, 2017; 66(47): 1300-1306
Many Infections Still Diagnosed Late

Percentage of Persons Diagnosed with Late Stage Disease (AIDS), By Year

Question #3

What percentage of new infections are attributed to people undiagnosed or not linked to care?

1. 25%
2. 50%
3. 75%
4. 90%
What percentage of new infections are attributed to people undiagnosed or not linked to care?

- 25%: 11%
- 50%: 28%
- 75%: 44%
- 90%: 17%

Source: https://api.cvent.com/polling/v1/api/polls/spobs44z
Most Infections from Persons Undiagnosed or Not in Care

Estimated Number of HIV Transmissions Along the HIV Care Continuum, U.S. 2009

<table>
<thead>
<tr>
<th>Population</th>
<th>Transmissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undiagnosed</td>
<td>18.1%</td>
</tr>
<tr>
<td>Not Retained</td>
<td>45.2%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>62.3%</td>
</tr>
</tbody>
</table>

* May be as high as 40%

Engagement and retention in care critical for ending new infections

With ART HIV Infection in 2018 is a Manageable Chronic Disease

• ART is life-long treatment that requires life-long care to suppress viral replication
  o Facilitated by multiple single-tablet once daily regimens with fewer side effects

• Getting suppressed requires getting diagnosed and into ongoing care
  o HIV care continuum is key focus

• “Near normal” life expectancy if effectively treated
  o Should be initiated as soon after diagnosis as feasible
  o Predisposition to certain “non-HIV-related” conditions that can mostly be managed with good preventative and early diagnosis
Same-Day ART – San Francisco General Hospital


Source: Pilcher et al., J Acquir Immune Defic Syndr, 2017; 74(1):44-51
Same-Day ART – San Francisco General Hospital


Source: Pilcher et al., J Acquir Immune Defic Syndr, 2017; 74(1):44-51
Same-Day ART – Additional Experience

New Orleans: more rapid viral suppression (median days)

- Rapid start (n = 77): 30 days*
- Standard of care (n = 29): 68 days*

Haiti: longer engagement in care (days)

- Same-day start (SD, n = 347)
- Standard of care (SOC< n = 356)

Retained, overall
- SD: 79%
- SOC: 72%

Retained, VL <1000
- SD: 61%
- SOC: 52%

* Median time to suppression
** copies/mL

Source: Halperin et al., AIDS Patient Care STDs, 2018; 32(2):39-41, Koenig et al., PLoS Medicine, 2017; 14(7):e1002357
New HIV Diagnoses by Age, 2016, U.S. and Dependent Area

17% aged ≥ 50 years

Estimated Living with HIV Infection by Age, Year-End 2015, U.S.

2020: 50% aged ≥ 50 years

47% aged ≥ 50 years

Shifting Burden of Disease with Aging Population

Source: Schouten et al., Clin Infec Dis, 2014; 59(12):1878-1797
Shifting Burden of Disease with Aging Population

- Cardiovascular
- Cerebrovascular
- Diabetes
- COPD
- Renal impairment
- Non-AIDS cancer
- Bone loss

Source: Schouten et al., Clin Infec Dis, 2014; 59(12):1878-1797
Polypharmacy among persons aged 50-64 years

Number of medications prescribed > 180 days

- HIV infected (n = 199)
- General population (n = 8,172)

Source: adapted from Gimeno-Garcia et al., Clin Intervention Aging, 2015; 11(12):1149-1157
Question #4

What preventable condition is associated with most if not all of these outcomes and should be prioritized for people with HIV?

1. Tobacco smoking
2. Increasing BMI
3. Inactivity
4. Alcohol consumption
What preventable condition is associated with most if not all of these outcomes and should be prioritized for people with HIV?

- Tobacco smoking: 90%
- Increasing BMI: 6%
- Inactivity: 1%
- Alcohol consumption: 3%

Source: https://api.cvent.com/polling/v1/api/polls/sp-b89vsz
HIV-infected Adults Smoke More Tobacco and Quit Less

Frazier et al., Preventive Med 2018, 111:830-9
HIV-infected Adults Smoke More Tobacco and Quit Less

Frazier et al., Preventive Med 2018, 111:830-9
Summary: Where Are We Going?

• In 2018, new HIV diagnoses continue to decline but disproportionately (and increasingly) affect certain populations which we must prioritize with prevention efforts
  - MSM, especially young Latino/Hispanic and Black
  - The southern United States region

• Old threats (IDU-associated HIV) may be becoming new again

• With antiretrovirals, the possibility of true HIV control (i.e., no new infections) is within our grasp

• Treating the current cohort of people with HIV increasingly focused on managing and preventing comorbidities
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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For more information, contact CDC
1-800-CDC-INFO (232-4636)
3. Pre-Exposure Prophylaxis Protects Against Infection

Effectiveness and Adherence in Trials of Oral and Topical Tenofovir-Based Prevention
3. Pre-Exposure Prophylaxis Protects Against Infection

When taken consistently:

> 90% effective against sexual transmission
> 70% effective against infection through injection drug use
Indiana HIV Outbreak: Summary
Scott County pop. 24,000; Austin city pop. 4,200

Single strain of HIV spread rapidly within a dense network of persons who inject drugs (PWID) who were using the prescription opioid oxymorphone.

Adult HIV prevalence March 2017 (n = 215)

- Scott County (18,264*): 1.2%
- Austin, if home for 80% of cases (3,143*): 6.8%

Estimated lifetime cost of care
$US 100 million


*estimated population age ≥18 years, U.S. Census
Percentage of People with HIV Aware of Their Status, By State - 2012
Death Rates Among People Diagnosed with HIV, By State - 2012
Trends in Sexually Transmitted Disease Testing\textsuperscript{a} among Sexually Active Adults Receiving HIV Medical Care, 2009–2014 Cycles

$\beta_{\text{trend}} = 0.04, P_{\text{trend}} < 0.0001$


\textsuperscript{a}Testing for syphilis, gonorrhea, and chlamydia documented 12 months prior to interview
Counties Highly Vulnerable to New HIV or Viral Hepatitis Infections Due to Unsafe Injection Drug Use

van Handel, 2016, JAIDS, 73(3): 323-31
Most New HIV Diagnoses in Urban Areas

Percentages of Diagnoses of HIV Infection among Adults and Adolescents, by Region and Population of Area of Residence, 2015—United States

Note. Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. Data for the year 2015 are preliminary and based on 6 months reporting delay. Data exclude persons whose county of residence is unknown.
HIV Prevention Challenges for Rural Populations of PWID*

**Limited access to services**
- Large distances
- Few transportation options
- Uninsured

**Limited infrastructure**
- HIV and viral hepatitis testing
- Clinical HIV/HCV care services
- Prevention services for PWID
  - Medication-assisted therapy
  - Syringe services programs

*PWID = persons who inject drugs
Percentages of Diagnoses of HIV Infection among Adults and Adolescents, by Region and Population of Area of Residence, 2016—United States

Note: Data for the year 2016 are preliminary and based on 6 months reporting delay. Data exclude persons whose county of residence is unknown.
Number of women and men aged 15–44 with recent sexual activity and percentages who reported receiving a sexual risk assessment from a doctor or other medical care provider in the past year: United States, 2011–2015

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th></th>
<th>Men</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual activity assessed</td>
<td>47.0</td>
<td>22.7</td>
<td>24.0</td>
<td>18.4</td>
</tr>
<tr>
<td>Sex of partner (orientation)</td>
<td>32.6</td>
<td>35.9</td>
<td>22.7</td>
<td>14.8</td>
</tr>
<tr>
<td>Number of partners</td>
<td>35.9</td>
<td>22.7</td>
<td>14.8</td>
<td>13.3</td>
</tr>
<tr>
<td>Use of condoms</td>
<td>22.7</td>
<td>14.8</td>
<td>13.3</td>
<td>16.6</td>
</tr>
<tr>
<td>Type of sex (e.g., vaginal, anal, oral)</td>
<td>18.4</td>
<td>24.0</td>
<td>16.6</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Copen, National Health Statistics Reports; no 110.
Main reasons for never testing for HIV among women and men aged 15–44 who reported any HIV risk-related sexual or drug behaviors in the past year: United States, 2011–2015

Febo-Vazquez et al., National Health Statistics Reports; no 107.
Indiana HIV Outbreak: Geography

Scott County pop. 24,000; Austin city pop. 4,200

Scott County ranked 92\textsuperscript{nd} in many health and social indicators among Indiana’s 92 counties

- Lowest life expectancy
- 9\% unemployment
- 19\% poverty
- 21\% no high school
- Many uninsured

Adult prevalence as of February 1 2016 (n=188)

Scott County (18,264\textsuperscript{*}): 1.0 \%
Austin, if home for 80\% of cases (3,143\textsuperscript{*}): 4.6 \%


*estimated population age ≥18 years, U.S. Census
Four Scenarios of the Potential Impact of Expanded HIV Testing, Treatment and PrEP in the United States, 2015-2020

- **New infections**
- **HIV infections prevented due to expanded testing and treatment**
- **HIV infections prevented due to PrEP (assumes PrEP use among high-risk populations = 40% MSM; 10% PWID; 10% HET)**

### Scenario 1: Projected new infections by 2020 at current testing and treatment rates
- **265,330** new infections

### Scenario 2: If PrEP use increases among high-risk populations at current testing and treatment rates
- **217,109** new infections

### Scenario 3: If 85% of people diagnosed are linked to care, 60% achieve viral suppression, plus PrEP use
- **48,221** infections prevented through PrEP
- **144,434** new infections prevented through testing and treatment
- **88,908** new infections
- **31,988** infections prevented through PrEP

### Scenario 4: Achieving NHAS goals – if 85% of people diagnosed are linked to care, 80% achieve viral suppression, plus PrEP use
- **16,928** infections prevented through PrEP
- **168,132** new infections prevented through testing and treatment
- **16,000** new diagnoses per year

70% reduction in new diagnoses

Estimated Lifetime Risk of HIV Infection Based on CDC Surveillance Data 2010-2014

- Men Who Have Sex With Men: 1 in 6
- Women Who Inject Drugs: 1 in 26
- Men Who Inject Drugs: 1 in 42
- Heterosexual Women: 1 in 266
- Heterosexual Men: 1 in 524

Effective Treatment Saves Lives

Early ART associated with:
- 72% reduction in serious AIDS-related events (p < 0.001)

Early ART associated with:
- 44% reduction in main endpoint (95% CI 24-59%)

Estimated Lifetime Risk of HIV Infection Based on CDC Surveillance Data 2010-2014

One in “n”, by quartile

Estimated Lifetime Risk of HIV Infection Based on CDC Surveillance Data 2010-2014

One in “n”, by quartile

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