Aging and HIV
Identifying Care Needs

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Percentage of Adults Living with HIV Aged 50+ By Year and Region

Source: UNAIDS 2012 estimates.
Epidemiology of HIV in US

• By 2050, of the expected 1.5 M living with HIV in the US, about 50% will be age 50 and older

• In 2012, people aged 55 and older accounted for one-quarter (24%, 288,700) of the 1.2 M living with HIV

• Older people more likely to be diagnosed later and to die sooner
Challenges Faced

• Multi-morbidities
• Access to care
• Transportation
• Activities of daily living
• Economic issues
• Social isolation/stigma
• Depression
• Chronic pain/addiction
• Housing/homelessness
• Incarceration
• End of life issues
HIV is Associated with Increased Risk for Non-AIDS Conditions

Increased risk does not necessarily mean that these events occur “prematurely”
Primary Care Issues

• Screening for HIV
• Engagement in care
• Antiretroviral therapy
  – Initiation of ART
  – Simplification of ART
  – Measuring CD4, HIVRNA, GART
• Preventive care
  – Vaccines, TB screening, hepatitis A/B/C
Primary Care

• Screening for HIV in at risk patients
• Engagement in care
• Antiretroviral therapy
  – Initiation of ART
  – Simplification of ART
  – Measuring CD4, HIVRNA, GART
• Preventive care
  – Vaccines, TB screening, hepatitis A/B/C
Primary Care

- Labs – CBC, CMP, vitamin D, lipids, PSA
- Cancer screening – colon, anal, lung, liver, oral/pharyngeal
- Cervical cancer, breast cancer
- Ophthalmology and dental
- Cardiovascular – EKG, aspirin, stress testing, AICD
- Smoking cessation, alcohol use and abuse
- Substance abuse – cannabis, opioids, cocaine
- Chronic pain management
- Mental health – depression, suicide
- Bone health – DEXA, vitamin D, iPTH
- Exercise and fitness
- Psychosocial/economic/housing
Multi-morbidities

- Cardiovascular disease
- End-stage renal disease
- Non-AIDS defining cancers –
- Diabetes/obesity
- Fractures
- End stage liver disease
- HIV-associated neurocognitive disorder (HAND)
- Frailty
HIV and Myocardial Infarction

**Premature aging?**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th># of events</th>
<th>Mean age</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV-</td>
<td>56,456</td>
<td>286</td>
<td>55.3</td>
</tr>
<tr>
<td>HIV+</td>
<td>27,988</td>
<td>231</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Adjusted mean difference in age: -0.04 (-0.62, 0.54) years

No difference in age at diagnosis by HIV status

**Greater risk?**

<table>
<thead>
<tr>
<th></th>
<th>IR per 1,000 py</th>
<th>95% CI</th>
<th>aIRR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV-</td>
<td>1.31</td>
<td>(1.17, 1.47)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>HIV+</td>
<td>2.18</td>
<td>(1.92, 2.48)</td>
<td>1.81</td>
<td>(1.49, 2.20)</td>
</tr>
</tbody>
</table>

An 81% increase in the rate in HIV+ compared to HIV-

Linear regression models to estimate the mean difference in age at diagnosis and Poisson regression models to estimate incidence rate ratios (aIRR) were adjusted for age, race, sex, body mass index, alcohol use, cigarette smoking, hepatitis C infection, anemia, diabetes, hyperlipidemia, lipid-lowering medications, hypertension, anti-hypertension medications, and statin use.

Altoff K et al. *Comparison of Risk and Age at Diagnosis...* Clin Infect Dis 2015 Feb 15;60(4):627-38
HIV and End-Stage Renal Disease

**Premature aging?**

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<tr>
<td>HIV-</td>
<td>68,113</td>
<td>502</td>
<td>58.5</td>
</tr>
<tr>
<td>HIV+</td>
<td>31,139</td>
<td>346</td>
<td>55.3</td>
</tr>
</tbody>
</table>

3.2 years crude difference

Adjusted mean difference in age:
-0.23 (-0.69, 0.23) years

No difference in age at diagnosis by HIV status

**Greater risk?**

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<th>aIRR</th>
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<tbody>
<tr>
<td>HIV-</td>
<td>1.88</td>
<td>(1.72, 2.05)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>HIV+</td>
<td>2.93</td>
<td>(2.63, 3.25)</td>
<td>1.43</td>
<td>(1.22, 1.66)</td>
</tr>
</tbody>
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An 43% increase in the rate in HIV+ compared to HIV-

Linear regression models to estimate the mean difference in age at diagnosis and Poisson regression models to estimate incidence rate ratios (aIRR) were adjusted for age, race, sex, body mass index, alcohol use, cigarette smoking, hepatitis C infection, anemia, diabetes, hyperlipidemia, lipid-lowering medications, hypertension, anti-hypertension medications, and statin use.

Altoff K et al. *Comparison of Risk and Age at Diagnosis ....* Clin Infect Dis 2015 Feb 15;60(4):627-38
HIV and “Associated” Cancers

*Anal, Hodgkins, Lung, Liver, Oral Cavity and Pharynx

**Premature aging?**

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<tr>
<td>HIV-</td>
<td>66,991</td>
<td>565</td>
<td>57.8</td>
</tr>
<tr>
<td>HIV+</td>
<td>30,675</td>
<td>579</td>
<td>54.9</td>
</tr>
</tbody>
</table>

2.9 years crude difference

Adjusted mean difference in age:
-0.57 (-0.93, -0.21) years

7 month decrease in mean age at diagnosis in HIV+ compared to HIV-

**Greater risk?**

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<tbody>
<tr>
<td>HIV-</td>
<td>2.15</td>
<td>(1.98, 2.33)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>HIV+</td>
<td>4.97</td>
<td>(4.59, 5.40)</td>
<td>1.84</td>
<td>(1.62, 2.09)</td>
</tr>
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An 84% increase in the rate in HIV+ compared to HIV-

Linear regression models to estimate the mean difference in age at diagnosis and Poisson regression models to estimate incidence rate ratios (aIRR) were adjusted for age, race, sex, body mass index, alcohol use, cigarette smoking, hepatitis C infection, anemia, and diabetes.

Altoff K et al. Comparison of Risk and Age at Diagnosis .... Clin Infect Dis 2015 Feb 15;60(4):627-38
Weight Change after ART And Mortality
(Normal n=2226 Vs. Overweight/Obese n=1842)

*Adjusted for VACS Index at ART Initiation

Incidence of Diabetes by BMI at Baseline and Weight Gain Over 12 Months

Normal

Overweight

Obese

<table>
<thead>
<tr>
<th>Weight Gain</th>
<th>HIV -</th>
<th>HIV +</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5 - 10 lbs</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>+10 - 20 lbs</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>&gt; +20</td>
<td>13</td>
<td>37</td>
</tr>
</tbody>
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<tbody>
<tr>
<td>+5 - 10 lbs</td>
<td>38</td>
<td>8</td>
</tr>
<tr>
<td>+10 - 20 lbs</td>
<td>43</td>
<td>12</td>
</tr>
<tr>
<td>&gt; +20</td>
<td>23</td>
<td>16</td>
</tr>
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<tbody>
<tr>
<td>+5 - 10 lbs</td>
<td>73</td>
<td>4</td>
</tr>
<tr>
<td>+10 - 20 lbs</td>
<td>82</td>
<td>9</td>
</tr>
<tr>
<td>&gt; +20</td>
<td>64</td>
<td>9</td>
</tr>
</tbody>
</table>

Tate J et al. CROI [Poster] Atlanta, Georgia, March 3-6, 2013. Under Review
### HIV+ Men Not At Increased Risk of Fracture

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted model HR (95% CI)</th>
<th>Full model HR (95% CI)</th>
<th>HIV+ men only HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>1.32 (1.20, 1.47)</td>
<td>1.10 (0.97, 1.25)</td>
<td></td>
</tr>
<tr>
<td>Age (10 yr increments)</td>
<td>1.32 (1.25, 1.40)</td>
<td>1.52 (1.39, 1.66)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1.80 (1.60, 2.03)</td>
<td>1.85 (1.52, 2.25)</td>
<td></td>
</tr>
<tr>
<td>Alcohol use disorder</td>
<td>1.80 (1.50, 2.17)</td>
<td>1.50 (1.12, 2.02)</td>
<td></td>
</tr>
<tr>
<td>Liver disease</td>
<td>1.38 (1.10, 1.73)</td>
<td>1.39 (1.03, 1.87)</td>
<td></td>
</tr>
<tr>
<td>Current corticosteroids</td>
<td>1.45 (1.21, 1.74)</td>
<td>1.41 (1.06, 1.88)</td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td>1.21 (1.04, 1.42)</td>
<td>1.30 (1.00, 1.67)</td>
<td></td>
</tr>
<tr>
<td>Any PPI use</td>
<td>1.70 (1.51, 1.92)</td>
<td>1.55 (1.28, 1.89)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>0.82 (0.79, 0.85)</td>
<td>0.87 (0.77, 0.99)</td>
<td></td>
</tr>
<tr>
<td>BMI²</td>
<td>1.002 (1.000, 1.003)</td>
<td>1.002 (1.000, 1.005)</td>
<td></td>
</tr>
<tr>
<td>CD4/100 cells/mm³</td>
<td></td>
<td>1.01 (0.98, 1.05)</td>
<td></td>
</tr>
<tr>
<td>Current tenofovir use</td>
<td></td>
<td>1.29 (0.99, 1.70)</td>
<td></td>
</tr>
<tr>
<td>Current PI use</td>
<td></td>
<td>1.41 (1.16, 1.70)</td>
<td></td>
</tr>
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</table>

Also controlled for: congestive heart failure, pulmonary disease, peripheral vascular disease, drug abuse, major depressive disorder, CAD, diabetes, renal insufficiency. Adjustment for non-proportionality. HIV*log(time) HR: 1.09 (95% CI: 1.01, 1.18)

Womack JA et al. (2011). Increased risk of fragility fractures among HIV infected compared to uninfected male Veterans. PLoS ONE, 6: e17217
Coinfection with HIV and HCV

• 3.2 M in US with chronic HCV infection
  – 75% born during 1945-1965

• 10-30% of HIV-infected co-infected with HCV
  – 90% injection drug-users infected

• More rapid progression of liver fibrosis than HCV alone

• More rapid progression to decompensated liver
disease than without HCV mono-infected

• HCV now a leading non-AIDS cause of death

• Patients with cirrhosis higher incidence of
  hepatocellular carcinoma
Risk of End-stage Liver Disease in ART-treated HIV/HCV Co-infected Patients

Lo Re V et al., Open Forum Infectious Diseases 2015
HIV Associated Neurocognitive Disorders (HAND): Frascati Criteria

- **HIV-associated Dementia**
  - marked cognitive impairment with marked functional impairment
  - 3.2%

- **Mild Neurocognitive Disorder**
  - cognitive impairment with mild functional impairment
  - 12.6%

- **Asymptomatic Neuropsychological Impairment**
  - abnormality in 2 or more cognitive areas
  - 15%
Social Isolation By HIV Status and Age

Frailty in People Aging with HIV

• The cumulative effects of age-related deterioration in multiple physiologic systems and homeostatic mechanisms → greater vulnerability to stressors

• Nonspecific health complaints, fluctuating disability, falls, delirium.

• At higher risk for adverse outcomes

Brothers D et al. Frailty in people aging with HIV infection. JID 2014;210:1170-9
Deficits Defining Frailty in HIV

- Weight loss: unintentional weight loss of 10 lbs. or ≥ 5% of previous weight in last year
- Exhaustion: 3-4 times/wk
- Low activity: limited a lot – strenuous activity
- Slowness: timed 4 minute walk
- Weakness: grip strength by dynamometer
- Considered frail if 3 or more deficits present

Brothers D et al. Frailty in people aging with HIV infection. JID 2014;210:1170-9
Multi-morbidity and Polypharmacy
Polypharmacy

• Typically defined as >5 chronic drugs
  – Associated with diminished marginal benefit from additional medication due to:
    – Drug-drug interactions and cumulative toxicity
      • Cognitive compromise, falls, and organ system injury
    – Confusion leading to non-adherence

• Risk of adverse events increases approximately 10% with each additional medication

• Interacts with alcohol, tobacco, other substances

Gandhi TK. N Engl J Med 2003;348:1556-64
Chronic Medication Count by Age and HIV Status (VACS)

Medication Count and Mortality (VACS)

Seven or more medications is associated with an increased risk of mortality after adjusting for HIV status and disease severity.

*Note: reference is 3 medications

Edelman EJ et al. IDSA [oral], San Francisco, California, October 2-6, 2013.
DHHS Guidelines
Individualized Care

• Antiretroviral regimen – choice must include review of other conditions
• Older people at greater risk of adverse effects and drug-drug interactions
• Encourage regimen simplification with discontinuation of unnecessary medications as feasible

DHHS Guidelines: 2013  HIV, Aging and Antiretroviral Therapy
Preventive Care

- Immunizations – flu, Tdap, pneumococcal
- Smoking cessation
- Alcohol screening and treatment
- Cancer screening
- Chronic hepatitis B and C screening/treatment
- Sexual health – screening for STIs
- Diet and exercise - obesity
- Neurocognitive function
US Preventive Services Task Force for Seniors

- Abdominal aortic aneurysm
- Type 2 diabetes mellitus
- Alcohol misuse
- Aspirin use: prevention of CVD and colon cancer
- Cervical cancer
- Cognitive impairment
- Colorectal cancer screening
- Coronary heart disease screening
- Dental and periodontal disease
- Depression
- Drug use: illicit screening
- Falls prevention

- Glaucoma screening
- Hearing loss
- High blood pressure
- Impaired visual acuity
- Intimate partner violence and abuse
- Lipid disorders
- Motor vehicle occupant restraints
- Obesity/healthy diet
- Osteoporosis
- Suicide risk
- Tobacco smoking cessation

Published recommendations of USPSTF [http://www.uspreventiveservicestaskforce.org](http://www.uspreventiveservicestaskforce.org)