Geriatric Syndromes in HIV

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I currently have no relationships with any entity producing, marketing, re-selling, or distributing laboratory products or health care goods or services consumed by, or used on, patients.
Talk outline

- Geriatric syndromes
- Frailty/frailty measures
- Falls
- Fragility fractures/osteoporosis
Geriatric Syndromes

“Multifactorial conditions that result from deficits in multiple domains including clinical, psychosocial and environmental vulnerabilities. They provide ‘evidence’ of aging and predict clinically important outcomes such as health utilization and mortality”

- Frailty
- Gait Instability/Falls
- Cognitive impairment/dementia
- Pressure injuries
- Delirium
- Urinary incontinence
- Polypharmacy ($\geq 5$ pills)
- Functional impairment

Functional Impairment
Inability to independently perform Basic and Instrumental Activities of Daily Living

Independent > needs assistance > fully dependent

ADL
- Ambulation
- Bathing
- Eating
- Dressing
- Grooming
- Toilet

IADL
- Finances
- Food Preparation
- Housekeeping
- Laundry
- Medication
- Shopping
- Telephone
- Transportation
In older adults ADL impairment predicts
  ◦ Falls
  ◦ Depression
  ◦ Perioperative outcomes
  ◦ Need for long term care/nursing home placement
  ◦ Death
    • 27% two–year mortality rate if complete dependence on ADLs
    • > 40% two–year mortality rate if institutionalized

A functional assessment in patients can uncover potentially fixable problem areas

Uncovering vulnerabilities in people aging with HIV

The “Silver Project”, San Francisco
- Demonstration project (2012–2014) to enhance routine care of HIV infected adults 50 years and older
- 2 outpatient clinical sites (UCSF)

Objectives
- To perform a “comprehensive assessment of the physical, cognitive, psychological, social and behavioral health”
- To look for associations between age and other geriatric conditions

Uncovering vulnerabilities in people aging with HIV

- Participants (N=359)
  - Median age 57 (37.7% ≥ 60 years)
  - 85% male; 65.6% MSM; 57% white
  - 52% CD4 ≥ 500; 82% VL < 40
  - 85% HIV-infected ≥ 10 yrs

- 72% with college/some college or higher
  - 65.4% with annual income ≤ $20,000
  - 50% receiving disability

Vulnerabilities seen in people aging with HIV

- 41% had **fallen** in the past year
- 34% with **cognitive impairment** (MoCA <26)
- 34% moderate to severely **lonely**
- 27% moderate to severely **depressed**
- Taking a median of **11 meds** [range, 8–15]
- 12% dependent in ≥ 1 ADL
- Only 50% perceived having normal social supports

Geriatric Syndromes in an older HIV-infected San Francisco cohort

53.6% with ≥ 2 geriatric syndromes

N=155
Median:
Age 57
CD4 577
HIV < 400 (100%)
CD4 nadir 172
HIV infected 21 years

Age in quartiles
50-54 25.8%
55-59 39.4%
60-64 15.5%
65+ 19.4%

Frailty/Frailty measures

“You know it when you see it”
Consensus definition:

“A medical syndrome with multiple causes and contributors that is characterized by diminished strength, endurance and reduced physiological function that increases an individual’s vulnerability for developing increased dependency or death”

Demonstration of the Frailty Phenotype (HIV negative)

- Using data from the Cardiovascular Health Study
  - Four states (CA, MD, NC, PA)
  - Excluded if h/o parkinson’s, CVA, dementia, antidepressants
  - Baseline/annual evaluations; q 6 month phone calls with 7 years of follow up
  - Outcomes: incident disease; hospitalizations; falls; disability; mortality

Demonstration of the Frailty Phenotype
(Definition)

Presence of 3 or more of the following components:

1. **Shrinking**
   - unintentional $\geq 10$ lbs weight loss in past year
   - $\geq 5\%$ weight loss at a one year f/u visit

2. **Weakness**
   - Lowest quartile of grip strength (stratified by gender and BMI)

3. **Slowness**
   - Walking 15 feet in $\geq 6$ or 7 seconds (stratified by gender and height)

Demonstration of the Frailty Phenotype (Definition)

Presence of 3 or more of the following components

4. Poor endurance and energy
   — Self-reported exhaustion (CES-D scale)
   — “How often in the last week did you feel that… everything you did was an effort?”
     ..you could not get going?”

5. Low physical activity
   — Self report of activity/kilocalories expended per week (MN Leisure Time Activities Questionnaire)
   — Lowest quintile identified for each gender

Demonstration of the Frailty Phenotype (Results)

- N=5317; 65 – 101 years; 58% F; 85% white

- Baseline frailty prevalence of 6%
  - 47% pre-frail (1 or 2 components)
  - 46% robust (0 components)

- Frailty incidence of 7.2%, seen more in
  - Increases in 5-year age groups
  - Women vs men (2-fold)
  - African Americans
  - People with lower cognition
  - People with depression
  - Those with higher rates of comorbidities
  - Those with higher rates of disability

Demonstration of the Frailty Phenotype (Results)

- Frailty independently predicted
  - At 3 years:
    - Worsening mobility (HR 1.50; p < .0001)
    - Worsening ADL disability (HR 1.98; p < .0001)
    - Incident falls (HR 1.29; p = 0.54)
    - Incident hospitalizations (HR 1.29; p = .004)
    - Death (HR 2.24; p = .0001)

  - All findings (except falls) remained significant at 7 years (HR ranged 1.92–4.46)

- 2.63 odds of transitioning to “Frail” from “Pre-frail” (1 or 2 components) over 3 years

Prospective multicenter cohort of MSM (HIV+ and HIV-)
- HIV + (n=1946); HIV – (n=1048)

Men with frailty conversion (n=477)
- 84% on HAART (median 10.7 yrs)
- median CD4 512; 71% < 400

Independent predictors of frailty
- Age ≥ 65 aOR 3.47
- Depressive symptoms aOR 2.94
- Hx AIDS aOR 2.26
- Hx HIV without history of AIDS, NS

Prevalence of Frailty Phenotype

Rockwood Frailty Index in Geriatrics (HIV negative)

Frailty Index = accumulated deficits/number of deficits (40)  Frail ≥ 0.20

<table>
<thead>
<tr>
<th>List of 40 Variables included in the frailty index</th>
<th>Cut Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help Bathing</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help Dressing</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help getting in/out of Chair</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help Walking around house</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help Eating</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help Grooming</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help Using Toilet</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help up/down Stairs</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help lifting 10 lbs</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help Shopping</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help with Housework</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help with meal Preparations</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help taking Medication</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Help with Finances</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Lost more than 10 lbs in last year</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Self Rating of Health</td>
<td>Poor = 1, Fair = 0.75, Good = 0.5, V. Good = 0.25, Excellent = 0</td>
</tr>
<tr>
<td>How Health has changed in last year</td>
<td>Worse = 1, Better/Same = 0</td>
</tr>
<tr>
<td>Stayed in Bed at least half the day due to health (in last month)</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Cut down on Usual Activity (in last month)</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Walk outside</td>
<td>≤ 3 days = 1, ≤ 3 days = 0</td>
</tr>
<tr>
<td>Feel Everything is an Effort</td>
<td>Most of time = 1, Some time = 0.5, Rarely = 0</td>
</tr>
<tr>
<td>Feel Depressed</td>
<td>Most of time = 1, Some time = 0.5, Rarely = 0</td>
</tr>
</tbody>
</table>

Frailty index ≥ 0.20 found to be independent predictor of mortality in 754 HIV negative Americans ≥ 70

## Guaraldi/Rockwood Frailty Index (PLWH)

### Frailty Index = accumulated deficits/total deficits (37 non HIV-related)

<table>
<thead>
<tr>
<th>Frail ≥ 0.25</th>
<th>Pre-frail 0.08-0.24</th>
<th>Robust &lt; 0.08</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lipoatrophy</td>
<td>Multicenter AIDS Cohort Study (MACS) criteria [39]</td>
</tr>
<tr>
<td>2</td>
<td>Lipohypertrophy</td>
<td>MACS criteria [40]</td>
</tr>
<tr>
<td>3</td>
<td>Nonalcoholic fatty liver disease</td>
<td>Liver/spleen ratio &lt;1.1</td>
</tr>
<tr>
<td>4</td>
<td>Menopause or male hypogonadism</td>
<td>If female: FSH &gt; 30IU/l and LH &lt; 30IU/l and/or absence of menstruation &gt;1 year</td>
</tr>
<tr>
<td>5</td>
<td>High or low BMI</td>
<td>If male: testosterone &lt; 300 ng/dl</td>
</tr>
<tr>
<td>6</td>
<td>High waist circumference</td>
<td>&lt;18 or &gt;25 kg/m²</td>
</tr>
<tr>
<td>7</td>
<td>High visceral adipose tissue</td>
<td>If female: &gt;88 cm</td>
</tr>
<tr>
<td>8</td>
<td>Sarcopenia or presarcopenia</td>
<td>If male: &gt;102 cm</td>
</tr>
<tr>
<td>9</td>
<td>Insulin resistance</td>
<td>VAT &gt; 130 cm² or VAT/TAT ratio &gt;0.5</td>
</tr>
<tr>
<td>10</td>
<td>High total cholesterol</td>
<td>Fat-free mass index ≤-1 SD</td>
</tr>
<tr>
<td>11</td>
<td>High low-density lipoprotein</td>
<td>Homeostasis Model Assessment – Insulin Resistance [41] &gt; 2.8</td>
</tr>
<tr>
<td>12</td>
<td>Low high-density lipoprotein</td>
<td>&gt;200 mg/dl</td>
</tr>
<tr>
<td>13</td>
<td>High triglycerides</td>
<td>&gt;100 mg/dl</td>
</tr>
<tr>
<td>14</td>
<td>High homocysteine</td>
<td>&lt;40 mg/dl</td>
</tr>
<tr>
<td>15</td>
<td>Abnormal white blood cell counts</td>
<td>&gt;150 mg/dl</td>
</tr>
<tr>
<td>16</td>
<td>Anemia</td>
<td>If female: &gt;10 µmol/l</td>
</tr>
<tr>
<td>17</td>
<td>Hepatitis C coinfection</td>
<td>If male: &gt;15 µmol/l</td>
</tr>
<tr>
<td>18</td>
<td>Hepatitis B coinfection</td>
<td>&lt;4000 cells/µl</td>
</tr>
</tbody>
</table>

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Frailty index increments of 0.1 found to be independent predictor of mortality (aHR 1.63) in 2720 HIV + Italians (mean age 46; 68% male; CD4 588)

Guaraldi G. AIDS. 2015
The Edmonton Frail Scale (HIV negative)

Validated to be used in clinical settings by providers who have no geriatric training

<table>
<thead>
<tr>
<th>Frailty domain</th>
<th>Item</th>
<th>0 point</th>
<th>1 point</th>
<th>2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognition</td>
<td>Please imagine that this pre-drawn circle is a clock. I would like you to place the numbers in the correct positions then place the hands to indicate a time of ‘ten after eleven’</td>
<td>No errors</td>
<td>Minor spacing errors</td>
<td>Other errors</td>
</tr>
<tr>
<td>General health status</td>
<td>In the past year, how many times have you been admitted to a hospital?</td>
<td>0</td>
<td>1–2</td>
<td>≥2</td>
</tr>
<tr>
<td></td>
<td>In general, how would you describe your health?</td>
<td>‘Excellent’, ‘Very good’, ‘Good’</td>
<td>‘Fair’</td>
<td>‘Poor’</td>
</tr>
<tr>
<td>Functional</td>
<td>With how many of the following activities do you require help? (meal preparation, shopping, transportation, telephone, housekeeping, laundry, managing money, taking medications)</td>
<td>0–1</td>
<td>2–4</td>
<td>5–8</td>
</tr>
<tr>
<td>independence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social support</td>
<td>When you need help, can you count on someone who is willing and able to meet your needs?</td>
<td>Always</td>
<td>Sometimes</td>
<td>Never</td>
</tr>
<tr>
<td>Medication use</td>
<td>Do you use five or more different prescription medications on a regular basis?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>At times, do you forget to take your prescription medications?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

EFS validated against a comprehensive geriatric assessment and clinician impression of frailty in 158 Canadians ≥ 65 years (mean age 80.4; 47% male)

Rolfson D. Validation and reliability of the Edmonton Frail Scale. Age and Aging 2006
While significant associations differed according to the instrument used, frailty was associated with poorer quality of life on all three

Australian men 50+ with HIV on cART > 6 months (N=93)

Edmonton Frail Scale
n=14 (15.1%)
- Osteoporosis (OR 7.51)
- Serious non-AIDS events (OR 7.71)
- AIDS (8.53)

Frailty index (Rockwood)
n= 21 (22.6%)
- Osteoporosis (OR 4.84)
- Serious non-AIDS events (OR 4.27)
- AIDS (4.62)

Frailty phenotype (Fried)
n=10 (10.8%)
- pre-1996 ART initiation (OR 3.56)
- Depression (OR 3.74)
Veterans Aging Cohort Study (VACS) Index

- Clinically feasible measure originally created for HIV positive veteran populations
- Demonstrated generalizable predictive accuracy
  - All cause mortality (Justice et al. 2013)
  - Cause–specific mortality (Tate et al., 2013)
  - Hospitalization (Akgun et al., 2013)
  - MICU admits (Akgun et al., 2013)
  - Fragility fractures (Womack et al., 2013)
- Associated with:
  - Cognitive performance (Franklin et al, 2013)
  - Functional performance (Erlandson et al., 2013)

http://vacs.med.yale.edu/IC/; http://hiv-age.org/2014/05/17/assessing-frailty-functional-capacity/
VACS Index

Creates a score by summing pre-assigned points for

- Age
- HIV parameters
  - CD4/HIV VL
- Hemoglobin
- End organ damage
  - Kidney disease (eGFR)
  - Advanced liver fibrosis (FIB-4)
- HCV co-infection (ever)

FIB-4 = age [yr] x AST/platelet x ALT

eGFR = \( 186.3 \times (\text{Cr}) - 1.154 \times (\text{age}) - 0.203 \times (0.742 \text{ for woman}) \times (1.21 \text{ if black}) \)

https://vacs.med.yale.edu/calculator/IC
Last comments on Frailty

- Fried’s Phenotype; Frailty Index; VACS are the most commonly used frailty instruments in research.

- There are a multitude of shorter frailty instruments for clinicians (FRAIL Scale; Edmonton; Gérontopôle Frailty Screening Tool).

- No matter what instrument used, the presence of frailty predicts poor outcomes in both HIV infected and uninfected.

- Individual clinicians are left to decide which frailty instrument they want to incorporate in their daily practice, and how it will affect their patient’s treatment plan.
Falls, Fractures and Osteoporosis
Falls in HIV-infected Older Adults

- “A fall is an event which results in a person coming to rest inadvertently on the ground or floor or other lower level.”

- Falls are the most common cause of functional decline and inability to care for oneself, thus leading to institutionalization (e.g. SNF/LTC care).

- For a small group of HIV+ women, the experience of falling signified “‘the beginning of the end’ and a source of social isolation, changing family roles, diminished sense of self, and stigma.”

WHO definition of falls; Womack J et al. PLOS one 2018. Sharma A; Antivir Ther 2016.
HIV infected older adults are more likely to have conditions associated with falls than HIV uninfected (cognitive impairment, frailty, polypharmacy).

Slow gait speed and poor physical performance in older HIV+ men suggest an increase risk of falls and functional decline.

Predictors of falls in HIV+ women include depression (OR 2.63), peripheral neuropathy (OR 2.37), illicit drugs (OR 2.70), ≥ 3 CNS active agents (OR 3.74), frailty (OR 17.3, recurrent falls*).

Sharma A; Antivir Ther 2016; *Tassiopoulos, K. AIDS 2017.

8,525 HIV-infected
2,208,792 non HIV-infected patients

Women

Men

2.49 vs. 1.72
P = 0.002
(overall comparison)

3.08 vs. 1.83
P<0.0001
(overall comparison)
Osteoporosis (definition)

“systemic skeletal disorder characterized by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and fracture.”

Normal vertebral body

Osteoporotic vertebral body
**Osteoporosis diagnosis (WHO)**

- **DEXA (Dual-energy x-ray absorptiometry)**
  - Normal: \( T\)-score > -1.0
  - Osteopenia: \( T\)-score = -1.0 to -2.5
  - Osteoporosis: \( T\)-score ≤ -2.5
  - Severe osteoporosis: \( T\)-score ≤ -2.5 & fragility fracture

- **Fragility fracture**
  - a fracture caused by an injury that would be insufficient to fracture normal bone. *i.e. a fracture resulting from a fall from a standing height or less, or presenting in the absence of obvious trauma.*

- **Elderly (HIV−) sustaining fragility hip fractures**
  - 12 month mortality rates ranges from 12 to 37 % (> 90 % if not repaired)
  - 50% of patients are unable to regain their ability to live independently

\( T\) score = patient's bone mineral density (BMD) c/w that of a young-adult female reference population;  
[https://www.who.int/chp/topics/Osteoporosis.pdf](https://www.who.int/chp/topics/Osteoporosis.pdf)
FRAX (WHO 2008)

- Age
- Gender
- Race
- Weight / Height
- Previous Fracture
- Current smoking
- Glucocorticoid use
- Alcohol ≥3 units/day
- Rheumatoid Arthritis
- Parental hip fracture
- Secondary Osteoporosis (type 1 diabetes, osteogenesis imperfecta, untreated hyperthyroidism, chronic malnutrition, malabsorption or chronic liver disease)
- Femoral Neck Bone Mineral Density (BMD) (optional)

https://www.sheffield.ac.uk/FRAX/tool.jsp
Major osteoporotic fracture – fracture of the spine, forearm, proximal humerus or hip

Osteoporosis Risk Factors in HIV

- **Patient risk factors**
  - All variables included in FRAX score
  - Opiate Use
  - Physical Inactivity
  - Hypogonadism/menopause
  - Low Vitamin D
  - Hepatitis C
  - Frailty

- **HIV–related risk factors**
  - Inflammation and viral proteins causing low BMD
    - \( \uparrow \) bone resorption
    - \( \downarrow \) bone formation
  - ART toxicities
    - At ARV initiation (\( \downarrow \) BMD by 2–6% over 96 weeks)
    - TDF > boosted PI > Integrase inhibitors

What to Do to Prevent Bone Loss with ART Initiation?

- Calcium and vitamin D supplementation

- Avoid TDF (instead ABC, TAF, Nuke-sparing)¹
  - 2–3% increase in BMD over 2–3-yrs PLWH who switch from TDF to tenofovir alafenamide (TAF)

- Avoid PIs (instead, INSTI, RPV, EFV)²

- Start ART at a higher CD4 cell count

- ? Pre–ART Bisphosphonate (ZOL 57% reduction bone loss at week 48 in ATV/r/TDF/FTC)³

<table>
<thead>
<tr>
<th>WHO TO SCREEN?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guidelines for Osteoporosis Screening with DEXA</strong></td>
</tr>
</tbody>
</table>

### HIV UNINFECTED


<table>
<thead>
<tr>
<th>DEXA indicated</th>
<th>✓ Women ≥ 65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✓ Men ≥ 70 years</td>
</tr>
<tr>
<td></td>
<td>✓ History of fragility fracture &gt; 50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEXA indicated with following risk factors <em>(partial list)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-menopausal women OR men 50–69 with history of rheumatoid arthritis hypo-gonadal Low BMI (&lt; 19) Alcohol High risk medications (AED) Current/prior excessive glucocorticoid use (≥ 5 mg x 3 months)</td>
</tr>
</tbody>
</table>

### HIV INFECTED

**IDSA/HIV Medicine Association (2015)**

<table>
<thead>
<tr>
<th>DEXA indicated</th>
<th>✓ All post-menopausal women (PM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✓ Men &gt; 50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEXA indicated with following risk factors <em>(partial list)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>History of fragility fracture</td>
</tr>
<tr>
<td>Current/prior excessive glucocorticoid use (≥ 5 mg x 3 months)</td>
</tr>
<tr>
<td>High risk of falls at any age</td>
</tr>
<tr>
<td>Age 40–50 years with FRAX score &gt; 10% for any osteoporotic fracture (“secondary cause” checked)</td>
</tr>
</tbody>
</table>

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Those with hip or vertebral fragility fractures

Those with osteoporosis by DEXA (T-score \( \leq -2.5 \) at femoral neck, hip, or spine)

Those with osteopenia by DEXA (T-score = \(-1 \) and \(-2.5 \) at hip or vertebrae)

AND

a FRAX score of \( \geq 3\% \) for hip OR \( \geq 20\% \) for “all major osteoporosis-related fractures”

Cosman F et al, Osteoporosis Int 2014.

*applies to post-menopausal women and men \( \geq 50 \) years
Bisphosphonates encompass the majority of prescriptions for osteoporosis
- Alendronate 70 mg once/weekly
- Zolendronic acid (ZOL) 5mg IV once/yearly

Bisphosphonates reduce incidence of vertebral & non-vertebral fractures by 25–50% in HIV neg (ZOL 70% reduction vertebral fxs)

Avoid if CrCl <35 and/or clinically significant esophageal disease (risk of pill esophagitis with alendronate)

Severe adverse effects
- atypical (sub trochanteric) femur fractures (1/100K to 5/10K)
- osteonecrosis of jaw: exposed bone in the maxillofacial region that does not heal within 8 weeks (< 1/10K)
1st-line treatment to prevent BMD loss in HIV+
- Increases in lumbar spine BMD by 8%
- Increases in total hip BMD by ~4%

There is no data on fracture outcomes for PLWH on bisphosphonates

No significant drug interactions w/ ART

<table>
<thead>
<tr>
<th>Author, year (N)</th>
<th>T-score</th>
<th>Medication (duration)</th>
<th>Spine</th>
<th>Hip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guaraldi, 2004 (N=41)</td>
<td>&lt; -1.0</td>
<td>Alendronate 70 mg/wk (1 yr)</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Mondy, 2005 (N=31)</td>
<td>&lt; -1.0</td>
<td>Alendronate 70 mg/wk (1 yr)</td>
<td>+5.2% vs +1.3%*</td>
<td>NS</td>
</tr>
<tr>
<td>McComsey, 2007 (N=82)</td>
<td>&lt; -1.5</td>
<td>Alendronate 70 mg/wk (1 yr)</td>
<td>+3.1% vs +1.1%*</td>
<td>+4.0% vs +1.4%†</td>
</tr>
<tr>
<td>Rozenberg, 2012 (N=44)</td>
<td>&lt; -2.5</td>
<td>Alendronate 70 mg/wk (2 yrs)</td>
<td>+7.4% vs +4.1%</td>
<td>NS</td>
</tr>
<tr>
<td>Bolland, 2007 (N=43)</td>
<td>&lt; -0.5</td>
<td>Zoledronic acid 4 mg/year (2 yrs)</td>
<td>+8.9% vs +2.6%†</td>
<td>+3.8% vs -0.8%†</td>
</tr>
<tr>
<td>Huang, 2009 (N=30)</td>
<td>&lt; -1.5</td>
<td>Zoledronic acid 5 mg/year (1 yr)</td>
<td>+3.7% vs +0.7%*</td>
<td>+3.2% vs -1.8%*</td>
</tr>
</tbody>
</table>

*P < 0.05; †P < 0.001; NS = not significant

Osteoporosis treatment with Zolendronic Acid in HIV

- Zolendronic acid more effective for increasing BMD in small group of male patients randomized to ZOL versus TDF → TAF switch
  - 7.4% increase in spine BMD versus 2.9% TDF → TAF
  - 4.6% increase in hip BMD versus 2.6% TDF → TAF

- Zolendronic acid PLUS TDF → TAF switch (144 weeks)
  - 5% vs 2.6% in spine BMD (< 0.05)
  - 4% vs 2.3% in hip BMD (NS)

- More data is needed to know how best to utilize bisphosphonates in PLWH

Bone health algorithm for PLWH (Swiss Association against Osteoporosis, 2019)

PLWH at high risk of fragility fractures:
- DXA
  - Normal BMD (T-score ≤ -1)
    - Reassess risk regularly
  - Osteopenia (-2.5 < T-score < -1)
    - Assess 10-years fracture probability with FRAX®
      - < intervention threshold for age
        - DXA after 2 years if T-score ≤ -1.5SD.
          - If BMD loss + high CTX levels
            - ART-naive: Avoid TDF-containing regimens
              - TDF-containing regimens: Switch to TAF-containing equivalents
        - ≥ intervention threshold for age
          - Postmenopausal women and men ≥ 50 years:
            - Initiate bisphosphonate
            - DXA after 2 years
              - Reassess need for treatment after 3-5 years
            - Premenopausal women and men <50 years:
              - Refer to osteoporosis specialist
          - PLWH at high risk of prior vertebral fracture
            - DXA + VFA
              - Osteoporosis (T-score ≤ -2.5)
                - Rule out or treat secondary causes
                  - Exclude renal phosphate wasting
              - Osteopenia (-2.5 < T-score < -1)
                - Assess 10-years fracture probability with FRAX®
          - PLWH with low-trauma hip or vertebral fracture
            - Rule out or treat secondary causes
              - Exclude renal phosphate wasting

Bone health algorithm for PLWH (Switzerland, 2019)

Variables confiding a “high risk for fragility fractures”

- Post-menopausal women
- Men ≥ 50 years
- History of clinical low trauma fracture(s)
- Evidence of vertebral fracture on previous thoracic and abdominal imaging
- Oral glucocorticoids ≥ 2.5 mg/d > 3 months
- Hypogonadism
- Malabsorption
- Inflammatory bowel diseases
- Primary hyperparathyroidism

Bone health algorithm for PLWH (Switzerland, 2019)

Variables confiding a “high risk for vertebral fracture”

- Age ≥ 70 years
- Significant height loss (>4 cm) or kyphosis
- Prior non-vertebral low-trauma fracture
- Oral glucocorticoids ≥ 2.5 mg/d > 3 months
- Hypogonadism
- Chronic inflammatory disease

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Conclusions

- As people with HIV are living longer screening for geriatric syndromes such as frailty, gait instability/falls and osteoporosis will become critical in the care of our patients.

- Screening for geriatric syndromes will ideally provide opportunities to decrease risks of functional decline, thus preventing ADL dependence/need for long term care.

- I look forward to fruitful collaborative efforts between Geriatric and HIV providers on how to allow all of our patients to age gracefully and independently.
Resources for HIV providers on Aging

Grand Opening: The Go-To Place On HIV And Aging
Editorial February 5, 2014 3 Comments

In the U.S. the HIV population is aging. By 2015 half of the over 1.4 million people infected with HIV will be age 50 and older. Each day 80 more people become part of this older adult group. And, 1 in every 6 new HIV diagnoses occurs in the age 50 and older population. This graying of... Continue Reading

Card For Clinicians Caring For HIV-Infected Older Adults
Science Spotlight February 5, 2014

CARD FOR CLINICIANS CARING FOR HIV-INFECTED OLDER ADULTS The Quick Reference Card for Managing Older Adults with HIV was developed out of the New York State Dept. of Health AIDS Institute Office Of The Medical Director. To obtain a copy, access www.hivguidelines.org. The AIDS Institute determined HIV and Aging as a priority over ten years ago. The number... Continue Reading
“These nursing homes don't know what's gonna hit them.”

“I hope to God they're gonna be ready for us.”

—Jan, aged 64, diagnosed in 2002, Mataura, New Zealand

Thank you! Questions?