Two methods of measuring frailty among people aging with HIV

Main characteristics of the Frailty Phenotype and the Frailty Index

The frailty phenotype (FP) and the frailty index (FI) are two of the most commonly used approaches to conceptualize and define frailty. These two instruments are indeed very different and should rather be considered as complementary.

<table>
<thead>
<tr>
<th>Frailty phenotype</th>
<th>Frailty Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs, symptoms</td>
<td>Diseases, activities of daily living, results of a clinical evaluation</td>
</tr>
<tr>
<td>Possible before a clinical assessment</td>
<td>Doable only after a comprehensive clinical assessment</td>
</tr>
<tr>
<td>Categorical variable</td>
<td>Continuous variable</td>
</tr>
<tr>
<td>Pre-defined set of criteria</td>
<td>Unspecified set of criteria</td>
</tr>
<tr>
<td>Frailty as a pre-disability syndrome</td>
<td>Frailty as an accumulation of deficits</td>
</tr>
<tr>
<td>Meaningful results potentially restricted to non-disabled older persons</td>
<td>Meaningful results in every individual, independently of functional status or age</td>
</tr>
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These two instruments are indeed very different and should rather be considered as complementary.

Cesari M et al Age and Ageing 2013; 0: 1–3
Differences at the basis of the two instruments

**Frailty Phenotype**

- Categorically defines the presence/absence of a condition of risk
- Such alert cannot generate immediate preventive or therapeutic interventions
- Specific conditions (such as disability or cognitive impairment) may affect the reliability or clinical utility.
- Ceiling effect
- Can be applied at the first patient visit

**Frailty Index**

- Act as an objective marker of deficits accumulation
- It can only be generated after (or in parallel with) a comprehensive geriatric assessment.
- Can ascertain the effectiveness of any intervention
- Can describe the health status trajectories over time.
- Can be embedded into an electronic health record

To assess and compare FP and FI in HIV patients in relation to:

1. Demographic factors
2. HIV-related factors,
3. Behavioural factors
4. RELATIONSHIP WITH NOSOGRAPHICALLY CLASSIFIED CONDITIONS
   • HIV-Associated Non-AIDS (HANA) condition
   • Multimorbidity
5. RELATIONSHIP WITH DISABILITY
Methods

Cohort study nested within the Modena HIV Metabolic Clinic (MHMC) cohort study
Consecutive HIV+ participants (first semester 2015)

- **Frailty Phenotype (FP)** – Fried L 1998 performed at patient visit by an occupational therapist
- **Frailty Index (FI)** – Rockwood 2005 (37 health variables, not including HIV variables and not including co-morbidities. They collected at the same study visit. The electronic patient chart automatically generate the index.

Outcome measures:
1. Demographic factors: sex, age
2. HIV-related factors: HIV& ART duration, Nadir and current CD4
3. Behavioural factors: smoke pack year, sedentary life
4. HIV-Associated Non-AIDS (HANA) condition
5. Disability. Assessed with:
   - IADL
   - ADL
   - Fall history
Disability outcomes

IADL
- Drugs
- Food
- Money
- Transport
- Home
- Laundry
- Buy
- Telephone

ADL: Daily living activities questionnaire (17 item):
- Drugs
- Food
- Money
- Transport
- Home
- Dressing
- Urine continence
- Cognition (organizing)
- Cognition (concentration)
- Cognition (thinking speed)
- Cognition (problem solving)
- Relationship (family, social)
- Working performance

Fall history
in the last 6 months
(restricted to pts aged >50 yrs)

No falls
86%

Falls
14%

IADL
- No disability
- Disability

IADL
7.6%

Fall history
- Severe
- Mild
- Robust

323 (88.25%)

1.3%

10.3%
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<th>Total (n=368)</th>
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<td><strong>Age</strong></td>
<td>50.68 (7.47) yrs</td>
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<td><strong>Males</strong></td>
<td>74%</td>
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<td><strong>BMI</strong></td>
<td>24.03 (3.36)</td>
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<td><strong>CD4 Current</strong></td>
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<td><strong>HIV duration</strong></td>
<td>232.16 (95.34) mts</td>
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Results

Total (n=368)

Age
50.68 (7.47) yrs

Males
74%

BMI
24.03 (3.36)

CD4 Current
751.54 (306.96) / μL

CD4 Nadir
225.26 (157.89) / μL

HIV duration
232.16 (95.34) mts

Frailty Index vs Frailty Phenotype

Frailty Phenotype

Frailty Index

p-value: < 0.01

normal
pre - frail
frail

normal
pre - frail
frail
1. Demographic factors

- **Age**: The difference in frailty phenotype (normal, pre-frail, frail) across age groups shows a significant p-value < 0.01.

- **Sex**: The frailty index by age for males shows a linear increase with p-value < 0.01, while for females, the p-value is 0.82. The distribution of frailty phenotype (normal, pre-frail, frail) by sex indicates no significant difference.
2. HIV-related factors

- HIV duration
- Nadir CD4

**FRAILTY PHENOTYPE - CD4 Nadir**

- Normal
- Pre-frail
- Frail

**FRAILTY PHENOTYPE - HIV DURATION**

- Normal
- Pre-frail
- Frail

**FRAILTY INDEX - CD4 Nadir**

- **p-value**: < 0.01

**FRAILTY INDEX - HIV DURATION**

- **p-value**: < 0.01
2. HIV-related factors

- **Current CD4**
  - Frailty Phenotype: Normal, Pre-frail, Frail
  - Frailty Index
  - HAART exposure
  - P-values: 0.519, 0.05, 0.102, <0.01

- **ART duration**
  - Frailty Phenotype: Normal, Pre-frail, Frail
  - Frailty Index
  - HAART months
  - P-values: 0.519, 0.05, 0.102, <0.01
3. Behavioural factors

- **Pack year**
  - Frailty Phenotype - Pack Year
    - Normal
    - Pre-frail
    - Frail
  - p-value: 0.32

- **Sedentary life**
  - Physical Activity - Frailty Phenotype
    - Normal
    - Pre-frail
    - Frail
  - p-value: < 0.01

- Frailty Index by pack year > 30
  - False
  - True
  - p-value: < 0.01

- Frailty Index by physical activity
  - False
  - True
  - p-value: < 0.01
4. HIV-Associated Non-AIDS (HANA) conditions
5. Disability outcomes (ADL)

FP vs ADL

p-value = 0.362

FI vs ADL

p-value = 0.015

FI vs FP in predicting Disability

FP - AUC 0.58
FI - AUC 0.63

p-value = 0.362
5. Disability outcomes

- FP vs IADL
- FP vs Fall
- FI vs IADL
- FI vs Fall

- IADL
- Fall

- p-value < 0.01
- p-value: < 0.01
- p-value 0.201
- p-value 0.056
Frailty may exist even in the absence of nosographically classified conditions (IADL)

3.5% of FRAIL patients (12 out of 323) have NOT Disability. FI of these patients is 0.36
Frailty may exist even in the absence of nosographically classified conditions (ADL).

2.7% of FRAIL patients (9 out of 323) have NOT Disability.  
\[ \text{FI of these patients is } 0.45 \]
Frailty may exist even in the absence of nosographically classified conditions (Fall)

3.5% of FRAIL patients (12 out of 323) have NOT Disability. FI of these patients is 0.45
Discussion

Frailty phenotype and the Frailty Index can be routinely measured in HIV setting.

Fl best capture behavioural and HIV risk factors and the association with HANA and MM.

RELATIONSHIP BETWEEN FRAILTY AND NOSOGRAPHICALLY CLASSIFIED CONDITIONS
Fl describes a risk profile closer to the one measured by the clinician

RELATIONSHIP OF FRAILTY WITH DISABILITY
FP and Fl are similarly associated with disability.

FP also identify a proportion of 2.7-3.5 % of HIV FRAIL patients in the absence of disability. In these individuals Fl range is 0.36-0.45.

The frailty phenotype and the Frailty Index are different and should be considered as complementary.