



Frailty Profiles of People Living with HIV; Beyond a Basic Classification

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for the Positive Brain Health Now investigators

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Rationale for this Research Topic

People ageing with HIV now face both HIV- and age-related health challenges. Frailty is one of the health challenges that can lead to negative outcomes such as hospitalizations or permanent disabilities.

Frailty is a multifactorial syndrome with causes originating from morbidities, genetics, lifestyle and the environment. 2013 Consensus definition of frailty defines it as “a multidimensional syndrome characterized by decreased reserve and diminished resistance to stressors”. In this statement, age is considered a necessary, but not sufficient contributor to frailty. Frailty remains difficult to define but the clinical phenotype is definitely recognizable often manifesting after a health event.

Fried's Frailty Phenotype is the predominant method to define frailty which based on meeting any 3 of the 5 criteria. The criteria are weight loss, slow gait speed, weak grip strength, exhaustion, and low physical activity. Instead of using the simple dichotomy, the patterns among these criteria may suggest different frailty phenotypes with potentially different causes and therefore different treatment approaches.

Pathway of this Research

The **objective** is to identify whether different frailty profiles emerge from five criteria of Fried's Frailty Phenotype and factors associated with emergent profiles

The **source of data** is from the ongoing Positive Brain Health Now (BHN) cohort involving 856 persons living with HIV recruited between 2014 and 2016 from five clinics in Canada.

The **outcome**, frailty, was operationalized based on Fried's Phenotype criteria ($\geq 3/5$), using self-reported items capturing slow gait speed, weak grip strength, exhaustion, low physical activity, and low BMI (< 21). **Latent class analysis** (LCA) was employed to identify frailty profiles of people living with HIV.

The effects of explanatory variables, sex, pain, numbness, mood, CRP, CD4-count, and co-morbidities were estimated using **multinomial regression** yielding odds ratios (OR) and 95% confidence intervals.

Analysis and Findings of this Research

Five profiles emerged: (A) low physical activity (62%), (B)-fatigue (14%), (C) arm/not leg weakness (11%), (D) arm and leg weakness (5%); and (E) global frailty (8%). People in profiles (C,D,E), 24%, would be classified as frail (≥ 3).

In comparison to profile A, a typical aging profile, the four frailty profiles (B,C,D,E) were explained by: pain (OR-range:2.15-44.79), numbness (OR-range:2.75-6.22), anxiety/depression (OR-range:3.04-3.70), and thyroid (OR-range:2.59-6.67). Profiles B,C and D were also explained by arthritis (OR-range:2.30-4.10)

Classes	A (n=532 / 63.0%)	B (n=108 / 12.8%)	C (n=68 / 8.0%)	D (n=100 / 11.8%)	E (n=37 / 4.4%)
Definition of the classes	Low physical activity	Fatigue	Global frailty	Arm but not leg weakness	Arm and leg weakness
Class membership probabilities	0.62	0.14	0.08	0.11	0.05
BMI	0.89	0.99	0.82	0.84	0.93
Exhaustion	0.59	0.63	0.45	0.81	0.46
Physical Activity	0.48	0.57	0.97	0.60	0.97
Walking several blocks	0.96	0.70	0.55	0.60	0.55
Lifting and Carrying	0.96	0.94	0.84	0.83	0.80

Classes	A	B	C	C	E
Definition of the classes	Low physical activity	Fatigue	Global frailty	Arm but not leg weakness	Arm and leg weakness
		OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Female sex	Ref	1.06 (0.58-1.94)	1.27 (0.63-2.55)	2.08 (1.23-3.51)	2.44 (1.13-5.26)
Pain (moderato to extreme)	Ref	2.15 (1.39-3.34)	10.79 (4.83-24.08)	8.07 (4.39-14.87)	44.79 (6.09-329.16)
Numbness (moderate to severe)	Ref	2.75 (1.28-5.89)	6.22 (2.99-12.93)	3.03 (1.41-6.51)	3.00 (0.97-9.26)
Anxiety/Depression (moderato to extreme)	Ref	3.13 (2.00-4.90)	3.26 (1.89-5.64)	3.70 (2.30-5.94)	3.04 (1.49-6.23)
Arthritis	Ref	1.00 (0.49-2.05)	4.10 (2.25-7.48)	2.78 (1.59-4.85)	2.30 (0.96-5.51)
Thyroid	Ref	3.13 (1.33-7.36)	3.95 (1.55-10.08)	2.59 (1.02-6.53)	6.67 (2.42-18.38)
Hypertension	Ref	1.59 (1.00-2.53)	1.26 (0.70-2.27)	1.40 (0.86-2.28)	1.21 (0.55-2.65)
Kidney disease	Ref	1.49 (0.71-3.12)	2.23 (1.02-4.88)	2.18 (1.11-4.31)	1.29 (0.37-4.42)
Lung disease	Ref	1.15 (0.69-1.92)	0.82 (0.41-1.62)	1.57 (0.96-2.58)	1.80 (0.86-3.77)
Liver disease	Ref	0.63 (0.34-1.18)	0.99 (0.51-1.93)	0.88 (0.49-1.58)	2.23 (1.08-4.61)
Diabetes	Ref	1.17 (0.58-2.33)	1.37 (0.62-3.05)	1.40 (0.71-2.75)	3.31 (1.47-7.44)
Angina (chest pain)	Ref	2.10 (0.84-5.19)	1.40 (0.39-4.90)	1.93 (0.74-5.03)	0.84 (0.10-6.52)
Stomach ulcer	Ref	1.46 (0.61-3.50)	0.97 (0.28-3.33)	1.84 (0.80-4.22)	0.58 (0.07-4.47)
CR-P ≥ 4	Ref	1.60 (0.98-2.60)	0.96 (0.53-1.74)	0.89 (0.53-1.48)	0.95 (0.44-2.05)
CD4 < 500	Ref	0.84 (0.53-1.32)	0.80 (0.46-1.41)	1.21 (0.78-1.90)	1.29 (0.65-2.55)

Lessons Learned from this Research

Five profiles emerged from the data and people met frailty criteria through different impairment profiles.

Clinically, all the five profiles are discernible, however, in research they fall under the same umbrella term “frail”.

Frailty is considered a clinical scenario that “you know it when you see it”, when a patient presents with recognizable inability to recover from a stressor (e.g., covid-19 or surgery).

Simple classification methods may not be sufficient to quantify frailty for research purposes.