Latent Class Analysis Identifies Distinct Comorbidity Profiles in Older (≥ 65 years) People With HIV

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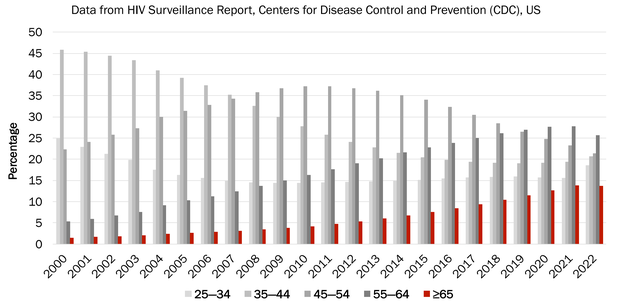
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— BACKGROUND —

- Advances in HIV treatment have prolonged life expectancy of people with HIV (PWH). This has resulted in a growing population of older PWH (≥ 65 years) in the US (*Figure 1*).

Figure 1: Estimated percentage of people with HIV by age and year in the US (2000 – 2022)



- Despite growing concerns that PWH experience comorbidities at higher rates, earlier ages, and in a more severe form than their HIV-negative counterparts, the health profiles of this aging population have been poorly delineated.
- Our objective was to characterize comorbidity profiles among older adults comparing PWH to those without HIV (HIV-).

— METHODS —

- We analyzed claims data from a 50% sample of Medicare fee-for service beneficiaries with Part D enrollment in 2016, obtained under a data use agreement with the Center for Medicare and Medicaid Services.
- Beneficiaries with HIV (n=13,080) were matched to HIV- beneficiaries (n=39,240) using propensity scores based on age, sex, race/ethnicity, state, and dual eligibility status.

Table 1: Characteristics of Medicare beneficiaries

	PWH	HIV-
N	13,080	39,240
Male (%)	71.9	71.9
Age Category (%)		
65 – 69	48.4	48.4
70 – 75	29.9	29.9
75 – 79	13.4	13.4
80+	8.4	8.4
Race (%)		
NH White	46.5	46.5
Black / AA	37.0	37.0
Asian / PI	1.2	1.2
AI / AN	0.4	0.4
Hispanic	12.5	12.5
Other	1.0	1.0
Unknown	1.3	1.3

- Outcomes included comorbidity profiles identified using latent class analysis (LCA) based on 62 comorbidities, coded using the Chronic Condition Warehouse algorithm.
- Logistic regression was used to estimate the odds of each outcome comparing matched HIV+ and HIV- beneficiaries.

Older (≥65 years) Medicare beneficiaries with HIV have distinct comorbidity profiles compared to matched HIV- beneficiaries.

— RESULTS —

Figure 2: Percentage of beneficiaries within each LCA comorbidity profile with each of the 62 comorbidities

	Minimal	Neuro-Psychiatric	Pre-Cardio-metabolic	Cardio-metabolic	Substance Use-Hepatic
Hypertension	25.0	78.8	89.0	99.3	70.3
Ischemic Heart Disease	6.4	36.7	40.1	86.8	35.0
Chronic Heart Failure	0.7	21.7	14.4	77.3	17.2
Peripheral Vascular Disease	1.3	37.4	14.9	57.5	15.9
Atrial Fibrillation	1.0	5.8	7.9	26.4	4.5
Stroke - TIA	0.3	16.7	3.5	20.6	4.4
Acute Myocardial Infarction	0	0.5	0.6	7.0	0.8
Anemia	5.4	46.7	29.5	82.7	35.0
Hyperlipidemia	18.1	50.9	74.6	82.5	38.6
Obesity	3.4	10.2	23.1	38.2	12.8
Cystic Fibrosis	0.2	2.4	0.7	2.9	1.1
Diabetes	9.1	45.7	52.2	79.2	24.8
Hypothyroidism	3.2	16.8	12.6	22.1	8.5
Chronic Kidney Disease	3.3	38.1	38.2	89.1	33.0
End-Stage Renal Disease	0	0.5	1.5	18.0	0.6
Depression	5.6	47.7	9.3	42.6	45.6
Other Psychotic Disorder	0.7	40.1	0	9.3	5.6
Anxiety	4.0	33.4	6.9	33.9	42.2
Schizophrenia	0.4	25.4	0	3.6	3.0
Bipolar Disorder	0.6	18.4	0.4	7.8	8.9
PSDS	0.2	4.8	0.2	3.2	4.8
PTSD	0.1	1.3	0	1.1	5.0
Senile Dementia	2.3	77.8	2.4	38.4	8.9
Alzheimer's Disease	0.2	37.4	0	8.4	0.2
Epilepsy	0.9	19.3	1.0	11.1	4.0
Mobility Impairment	0.4	18.7	1.9	19.8	3.9
Fibromyalgia	5.9	14.2	16.0	39.1	49.6
Intellectual Disability	0.3	7.5	0.3	0.4	0.1
Brain Injury	0	3.3	0.1	1.2	0.5
Cerebral Palsy	0.2	2.2	0	0.2	0.1
Learning Disability	0	1.4	0	0.7	0.1
Migraine	0.8	1.4	1.4	3.5	5.4
Other Developmental Delays	0	0.9	0	0.2	0
Spinal Cord Injury	0	0.8	0.2	2.0	1.5
Autism	0	0.7	0	0	0
Spina Bifida	0	0.4	0	0.3	0.1
Pressure/Chronic Ulcers	0.3	16.2	2.7	32.3	6.6
Osteoporosis	1.9	7.6	3.9	7.9	7.6
Hip/Pelvic Fracture	0	1.6	0.1	2.4	1.3
Muscular Dystrophy	0	0.1	0	0.1	0.1
Prostate Cancer	4.0	4.1	7.6	7.0	4.6
Colorectal Cancer	0.7	0.9	1.7	3.7	2.6
Lymphoma	1.0	1.5	1.9	3.6	2.5
Lung Cancer	0.4	0.8	0.8	3.4	5.0
Breast Cancer	0.7	1.5	1.7	2.6	2.3
Endometrial Cancer	0.1	0.1	0.2	0.4	0.3
Tobacco Use Disorder	4.3	11.0	6.6	25.2	48.8
Drug Use Disorder	0.5	1.9	0.1	11.4	39.5
Alcohol Use Disorder	1.2	6.3	0.9	9.9	26.2
Opioid Use Disorder	0.3	0.5	0	6.8	23.1
Viral Hepatitis	3.5	4.3	3.6	15.6	29.1
Liver Disease	1.7	4.2	5.3	19.6	20.5
Cataract	13.7	23.9	19.9	17.5	15.3
Glaucoma	5.5	8.6	11.0	8.1	5.2
Blindness	0.1	3.4	0.6	4.1	0.9
COPD	2.7	15.9	9.9	49.1	39.1
Asthma	1.4	4.7	5.8	18.2	11.3
Rheumatoid Arthritis	12.9	34.5	34.8	57.6	48.8
Multiple Sclerosis	0.2	1.0	0.2	0.6	0.4
Deafness	2.8	8.6	5.2	9.0	4.9
Hyperplasia	6.2	16.5	17.1	25.5	14.7
Sickle Cell Disease	0	0.1	0.1	0.2	0.1

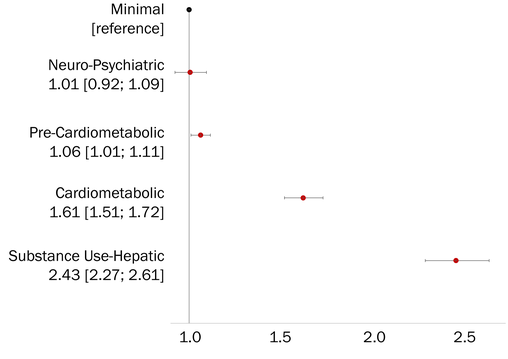
least prevalent to most prevalent comorbidity among classes

- The cohort was predominantly male (71.9%), White (46.5%) or Black (37.0%) %), and had a mean age of 71.3 (SD=5.36) (*Table 1*).
- LCA identified 5 comorbidity profiles (*Figure 2*) in the matched PWH and HIV- study cohort that we named as follows:

Profile #	% of cohort	Profile name
1	32.3%	Minimal
2	7.5%	Neuro-Psychiatric
3	39.5%	Pre-Cardiometabolic
4	12.3%	Cardiometabolic
5	8.4%	Substance Use-Hepatic

- Beneficiaries with HIV had significantly increased odds of belonging to the Pre-Cardiometabolic (OR=1.06, 95% CI [1.01; 1.11]), Cardiometabolic (OR=1.61, 95% CI [1.51; 1.72]), and Substance Use-Hepatic (OR=2.43, 95% CI [2.27; 2.61) classes compared to matched HIV- beneficiaries (*Figure 3*).

Figure 3: Logistic Regression: OR [95%CI] for the odds of belonging to each LCA comorbidity profile comparing matched HIV+ and HIV- beneficiaries



— RESULTS —

- The mechanisms underlying these comorbidity profiles are likely multifactorial and driven by the interaction of aging processes along with:

  HIV infection: associated with systemic chronic immune activation and implicated in the development of several conditions.

  ART use: linked to diabetes, liver toxicity, kidney damage, neuropathy, abnormal metabolic profiles, and cardiovascular diseases.

  High prevalence of suboptimal health behaviors: such as smoking, alcohol consumption, and substance use.

— CONCLUSIONS —

- Identifying these comorbidity profiles offers a valuable analytic tool for defining clinically meaningful subgroups, which may inform efforts on prevention, screening, and comprehensive management of comorbidities for older PWH in the US.
- Future directions include identifying comorbidity profiles in other years (2008–2015) and exploring the relationship between comorbidity profiles and adverse outcomes.

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