Non-AIDS Illness Burden Differs by Sex, Race, and Insurance Type in Aging HIV+ Adults

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FJ Palella Jr[1], R Hart[2], C Armon[2], E Tedaldi[3], B Yangco[4], R Novak[5], L Battalora[2,6], D Ward[7], B Dean[2], and K Buchacz[8] for the HIV Outpatient Study (HOPS)

[1]Northwestern University Feinberg School of Medicine, Chicago, IL, US; [2]Cerner Corporation, Kansas City, MO, US; [3]Lewis Katz School of Medicine at Temple University, Philadelphia, PA, US; [4]Infectious Disease Research Institute, Inc., Tampa, FL, US; [5]University of Illinois at Chicago, Chicago, IL, US; [6]Colorado School of Mines, Golden, Colorado, US; [7]Dupont Circle Physicians Group, Washington, DC, US; [8]U.S. Centers for Disease Control and Prevention, Atlanta, GA, US

Frank J. Palella Jr. MD
Professor of Medicine
Division of Infectious Diseases
Northwestern University
Feinberg School of Medicine
f-palella@northwestern.edu

INTRODUCTION

- Investigating the epidemiology of non-AIDS chronic co-morbidities (NACM) among aging HIV-infected persons is essential to optimize clinical care and to plan health screening strategies.
- We evaluated number and types of NACMs in a large diverse population of HIV-infected adults receiving antiretroviral therapy (ART).

METHODS

Study Population: HIV Outpatient Study (HOPS) patients at 8 U.S. HIV clinics, seen during 1/1/1997 to 6/30/2015, who were followed for a minimum of 5.0 years with ≥75% of observation time on ART and having ≥75% of time on ART with HIV RNA levels <200 copies/mL.

Statistical Methods: In stratified analysis (by age at last observation: 18-40, 41-50, 51-60, ≥61 years), we assessed:

- Number and types of NACMs documented in medical records anytime during HOPS observation.
- Differences in NACM prevalence and type by age group, sex, race, HIV transmission risk, payor, body mass index (BMI), and years of ART exposure.
- Modeling performed using Poisson regression.

NACMs included were cardiovascular disease, cancer, hypertension, diabetes, dyslipidemia, degenerative joint disease/fracture, chronic Hepatitis B (HBV) or Hepatitis C (HCV) infection, chronic kidney disease, anemia, and psychiatric illness.

- NACMs were assessed using abstracted data collected by routine medical records review: lab records, documented diagnoses, and treatments.
- Participants with evidence of an NACM from at least one of the three data sources were classified as having that NACM, except for hypertension, diabetes, and dyslipidemia, for which evidence was required from at least two of the three sources.

RESULTS

Of 1,540 patients, there were (see Table 1):

- 81% men, 26% non-Hispanic black, 55% with private insurance.
- 61% men who have sex with men (MSM), 24% heterosexuals and 8% persons with injection drug use (IDU) history.
- Median observation time of 10.9 years.

Mean number of NACMs increased with advancing age category; 1.4, 2.1, 3.0, 3.9, respectively (Figure 1).

- Overall prevalence of each individual NACM increased with older age categories (P<0.001) except for HBV infection and psychiatric illness (Figure 2).

Significant differences (all P<0.05) in mean number of NACMs were found by sociodemographic characteristics (Figure 3):

- Sex (women > men, 3.1 vs 2.6), race (blacks > non-blacks, 3.0 vs 2.6), HIV transmission risk (IDU > heterosexual and MSM, 4.3 vs. 3.0 and 2.4), and insurance status (public > private, 3.6 vs 2.1).
- These differences were especially apparent in older age groups (51-60 and > 61 years, 3.0 and 3.9 vs. 1.9 for ≤ 50 years of age), and were driven primarily by differences in specific NACMs: cancer and chronic kidney disease.

In the multivariable model, factors associated with higher number of NACMs were increasing age, IDU or heterosexual HIV transmission risk, public or self-pay/no healthcare insurance, BMI ≥ 30, and longer ART exposure (P<0.05 for all; Table 2).

Table 1: Characteristics of HOPS participants who were followed for at least 5 years during 1/1/1997 to 6/30/2015 with ≥75% of observation time on ART and ≥75% of time on ART spent with HIV RNA levels <200 copies/mL (N=1,540)

Characteristics at end of observation, n (%) or median (IQR)	Overall (n=1,540)	Age at end of observation* (years) 18-40 (n=180)	41-50 (n=502)	51-60 (n=560)	≥ 61 (n=298)	P-value†
Sex at birth						0.171
Female	293 (19.0)	41 (22.8)	103 (20.5)	103 (18.4)	46 (15.4)	
Male	1247 (81.0)	139 (77.2)	399 (79.5)	457 (81.6)	252 (84.6)	
Race/ethnicity						0.017
Non-Hispanic white	900 (58.4)	82 (45.6)	299 (59.6)	332 (59.3)	187 (62.8)	
Non-Hispanic black	406 (26.4)	55 (30.6)	127 (25.3)	152 (27.1)	72 (24.2)	
Hispanic	183 (11.9)	35 (19.4)	58 (11.6)	61 (10.9)	29 (9.7)	
Other/Unknown	51 (3.3)	8 (4.4)	18 (3.6)	15 (2.7)	10 (3.4)	
HIV transmission risk group						0.009
MSM	939 (61.0)	115 (63.9)	317 (63.1)	338 (60.4)	169 (56.7)	
Heterosexual	375 (24.4)	47 (26.1)	120 (23.9)	136 (24.3)	72 (24.2)	
IDU	125 (8.1)	4 (2.2)	30 (6.0)	54 (9.6)	37 (12.4)	
Other/Unknown	101 (6.6)	14 (7.8)	35 (7.0)	32 (5.7)	20 (6.7)	
Payor						<0.001
Private	846 (54.9)	119 (66.1)	312 (62.2)	307 (54.8)	108 (36.2)	
Public	575 (37.3)	49 (27.2)	144 (28.7)	216 (38.6)	166 (55.7)	
Self pay/none	75 (4.9)	10 (5.6)	30 (6.0)	23 (4.1)	12 (4.0)	
Other/Unknown	44 (2.9)	2 (1.1)	16 (3.2)	14 (2.5)	12 (4.0)	
AIDS status	951 (61.8)	80 (44.4)	284 (56.6)	362 (64.6)	225 (75.5)	<0.001
BMI (kg/m^2)						<0.001
< 18.5	37 (2.4)	1 (0.6)	10 (2.0)	12 (2.1)	14 (4.7)	
18.5-24.9	608 (39.5)	77 (42.8)	178 (35.5)	201 (35.9)	152 (51.0)	
25-29.9	521 (33.8)	58 (32.2)	184 (36.7)	195 (34.8)	84 (28.2)	
≥ 30	365 (23.7)	44 (24.4)	128 (25.5)	148 (26.4)	45 (15.1)	
Unknown	9 (0.6)	0 (0.0)	2 (0.4)	4 (0.7)	3 (1.0)	
CD4 at ART initiation‡ (cells/mm^3)						0.279
< 50	158 (10.9)	15 (8.4)	54 (11.7)	58 (11.0)	31 (11.0)	
50-199	211 (14.6)	22 (12.3)	68 (14.8)	79 (15.0)	42 (14.8)	
200-349	235 (16.2)	40 (22.4)	77 (16.7)	79 (15.0)	39 (13.8)	
350-499	190 (13.1)	36 (20.1)	69 (15.0)	52 (9.9)	33 (11.7)	
500+	136 (9.4)	19 (10.6)	47 (10.2)	48 (9.1)	22 (7.8)	
Unknown	518 (35.8)	47 (26.3)	146 (31.7)	209 (39.8)	116 (41.0)	
Median CD4 at ART initiation (IQR) (n=930)	263 (96, 404)	316 (187, 405)	260 (101, 413)	248 (84, 407)	247 (77, 392)	0.085
Smoker, current/prior	820 (53.2)	81 (45.0)	255 (50.8)	317 (56.6)	167 (56.0)	0.022
Median years HIV+ (IQR)	15.4 (10.4, 21.0)	9.0 (7.1, 12.6)	14.0 (10.0, 18.6)	17.4 (11.9, 23.0)	19.3 (14.3, 25.0)	<0.001
Median years of ART (IQR) (n=1,448)	13.6 (8.7, 18.2)	7.9 (6.3, 11.1)	12.2 (8.6, 15.9)	15.8 (10.0, 19.1)	17.4 (12.5, 20.5)	<0.001
Median years of observation (IQR)	10.9 (7.5, 15.0)	7.5 (6.3, 9.7)	10.1 (7.3, 13.6)	12.0 (8.0, 16.2)	13.8 (10.1, 17.8)	<0.001

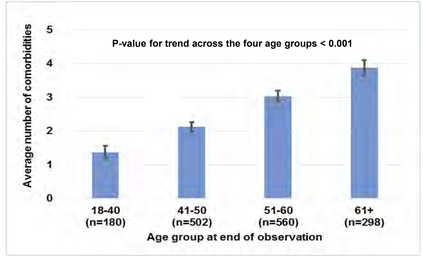
* earliest of death, last contact with HIV provider, or 6-30-2015

‡ Closest value from those documented 6 months prior through 3 months post ART initiation among those with ART initiation date known.

† Wilcoxon rank-sum tests for continuous variables, chi-square test for categorical variables, or Mantel-Haenszel chi-square tests for trend for ordinal variables

Abbreviations: AIDS, acquired immunodeficiency syndrome; ART, antiretroviral therapy; BMI, body mass index; HBV, hepatitis B virus; HCV, hepatitis C virus; IDU, injection drug users; IQR, interquartile range; MSM, males who have sex with males.

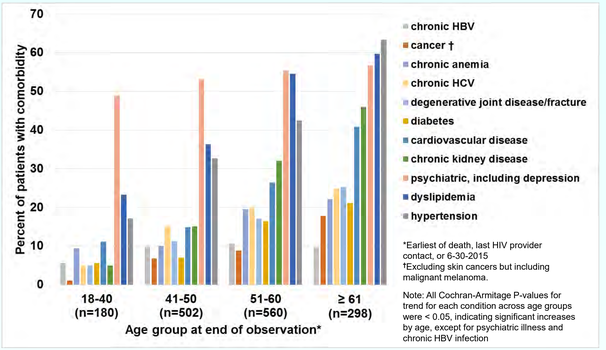
Figure 1: Mean number of non-AIDS co-morbidities (NACM) per participant by age stratum among HOPS participants who were followed for at least 5 years during 1/1/1997 to 6/30/2015 with ≥75% of observation time on ART and ≥75% of time on ART spent with HIV RNA levels <200 copies/mL (N=1,540)*



* Bars represent 95% confidence intervals for the average number of comorbidities.

The HIV Outpatient Study (HOPS) Investigators include the following persons and sites: Kate Buchacz, Marcus D. Durham, John T. Brooks Division of HIV/AIDS Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention (NCHHSTP), Centers for Disease Control and Prevention (CDC), Atlanta, GA; Harlen Hays, Rachel Hart, Thilakavathy Subramanian, Carl Armon, Bonnie Dean, Stacey Purinton, Dana Franklin, Cheryl Akridge, Nabil Rayeed, Cerner Corporation, Kansas City, MO; Frank J. Palella, Saira Jahangir, Conor Daniel Flaherty, Patricia Bustamante, Feinberg School of Medicine, Northwestern University, Chicago, IL; John Hammer, Kenneth S. Greenberg, Barbara Widick, Rosa Franklin, Rose Medical Center, Denver, CO; Bienvenido G. Yangco, Kalliope Chagaris, Infectious Disease Research Institute, Tampa, FL; Douglas J. Ward, Troy Thomas, Cheryl Stewart, Dupont Circle Physicians Group, Washington, DC; Jack Fuhrer, Linda Ording-Bauer, Rita Kelly, Jane Esteves, State University of New York (SUNY), Stony Brook, NY; Ellen M. Tedaldi, Ramona A. Christian, Faye Ruley, Dania Beadle, Princess Davenport, Lewis Katz School of Medicine at Temple University, Philadelphia, PA; Richard M. Novak, Andrea Wendrow, University of Illinois at Chicago, Chicago, IL; Benjamin Young, Mia Scott, Barbara Widick, Billie Thomas, APEX Family Medicine, Denver, CO.

Figure 2. Percentage of participants with specific non-AIDS comorbidities (NACMs) among HOPS participants who were followed for at least 5 years during 1/1/1997 to 6/30/2015 with ≥75% of time on ART and having ≥75% time on ART spent with HIV RNA levels <200 copies/mL (N=1,540)



*Earliest of death, last HIV provider contact, or 6-30-2015
†Excluding skin cancers but including malignant melanoma.

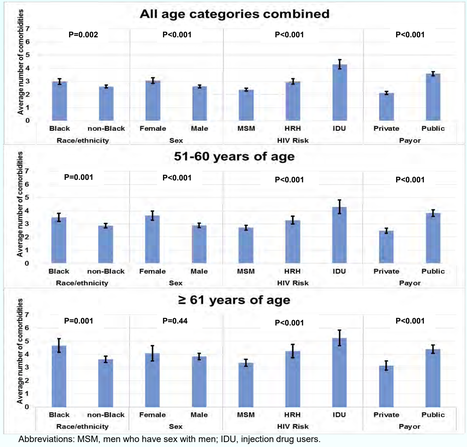
Note: All Cochran-Armitage P-values for trend for each condition across age groups were < 0.05, indicating significant increases by age, except for psychiatric illness and chronic HBV infection

Table 2. Univariate and multivariable Poisson regression evaluating factors associated with having greater numbers of age-related chronic non-AIDS comorbidities (NACMs) among HOPS participants who were followed for at least 5 years during 1/1/1997 to 6/30/2015 with ≥75% of time on ART and having ≥75% time on ART spent with HIV RNA levels <200 copies/mL (N=1,540).

Independent variables	Univariate RR (95% CI)	*P*-value	Multivariable aRR (95% CI)	*P*-value
Age group				
18-40	Referent		Referent	
41-50	**1.41 (1.25, 1.58)**	**<0.001**	**1.30 (1.15, 1.47)**	**<0.001**
51-60	**1.92 (1.71, 2.15)**	**<0.001**	**1.63 (1.44, 1.84)**	**<0.001**
61+	**2.36 (2.10, 2.65)**	**<0.001**	**1.87 (1.64, 2.13)**	**<0.001**
Female sex	**1.12 (1.04, 1.21)**	**0.002**	0.95 (0.87, 1.05)	0.32
Black race	**1.11 (1.03, 1.19)**	**0.004**	1.01 (0.94, 1.08)	0.83
HIV transmission risk group				
MSM	Referent		Referent	
Heterosexual	**1.21 (1.13, 1.30)**	**<0.001**	**1.11 (1.01, 1.22)**	**0.031**
IDU	**1.67 (1.54, 1.81)**	**<0.001**	**1.35 (1.22, 1.49)**	**<0.001**
Other/Unknown	**1.18 (1.05, 1.34)**	**0.008**	**1.11 (0.98, 1.26)**	**0.11**
Payor				
Private	Referent		Referent	
Public	**1.56 (1.47, 1.66)**	**<0.001**	**1.34 (1.25, 1.44)**	**<0.001**
Self pay/none	**1.24 (1.11, 1.39)**	**<0.001**	**1.23 (1.07, 1.41)**	**0.003**
Other/Unknown	**1.24 (1.06, 1.46)**	**0.009**	1.12 (0.94, 1.34)	0.22
Body mass index (kg/m^2)				
< 18.5	1.19 (0.95, 1.49)	0.138	1.06 (0.88, 1.26)	0.55
18.5-24.9	Referent		Referent	
25-29.9	0.97 (0.90, 1.04)	0.37	1.04 (0.97, 1.12)	0.25
≥ 30	**1.12 (1.04, 1.20)**	**0.002**	**1.18 (1.09, 1.27)**	**<0.001**
Unknown	1.25 (0.97, 1.60)	0.081	1.09 (0.75, 1.57)	0.65
Years observed in HOPS (per 5 years)	**1.20 (1.16, 1.24)**	**<0.001**	**1.05 (1.00, 1.11)**	**0.034**
Years ART exposure (per 5 years)	**1.16 (1.14, 1.19)**	**<0.001**	**1.05 (1.01, 1.09)**	**0.015**

Abbreviations: aRR, adjusted risk ratio; ART, antiretroviral therapy; CI, confidence interval; HOPS, HIV Outpatient Study; IDU, injection drug users; MSM, males who have sex with males; RR, risk ratio.

Figure 3. Mean number of non-AIDS comorbidities by race/ethnicity, sex, HIV transmission risk, and payor among HOPS participants who were followed for at least 5 years during 1/1/1997 to 6/30/2015 with ≥75% of time on ART and having ≥75% time on ART spent with HIV RNA levels <200 copies/mL (N=1,540)



Abbreviations: MSM, men who have sex with men; IDU, injection drug users.

LIMITATIONS

- Routinely collected medical abstraction data with variability in the timing of participant healthcare contact screenings.
- No information available on potential confounders, such as socioeconomic status.

CONCLUSIONS:

- We observed age-related increases in prevalence of non-AIDS chronic co-morbidities (NACM) and polymorbidity, with disproportionate NACM burden most apparent among older participants, women, blacks, and publicly insured persons. In fully-adjusted models, the observed excess NACM burden persisted for persons without private sources of healthcare payment.
- Our findings highlight the need for clinicians to consider demographic, healthcare coverage, and social determinants of health in the routine primary care of HIV-infected persons.
- These findings may inform healthcare delivery systems.

The findings and conclusions from this presentation are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.