Clinical Update

HIV-associated Wasting Continued to Occur in People Living With HIV, Despite Modern Antiretroviral Therapy

As HIV treatment advances and the management of persistent chronic comorbidities are prioritized, HIV-associated Wasting, as a disease state, should not be overlooked. A Retrospective Medical and Pharmacy Claims Study (2012-2018) across payer markets was conducted to understand the ongoing prevalence of HIV-associated Wasting in the United States.

Presented at the Miami Center For AIDS Research (CFAR)- HIV & Aging in the era of ART and COVID-19, February 8-9, 2021; Virtual.

EMD SERONO

Background

What is Real World Evidence (RWE)?

RWE is clinical evidence about the use and benefits or risks of a treatment based on real world data—obtained through randomized trials, pragmatic trials, or observational studies.

Study Strengths and Limitations

Strengths

- Claims databases allow for analysis of large numbers of patients over time and are generally representative of the US patient population.
- Pharmacy claims provide an understanding of a patient's intent to take a prescribed medication; whereas a medication order would only show what medication a prescriber is proposing to treat a patient.
- Ability to better understand underserved populations which were not available in previous clinical studies with traditional design.

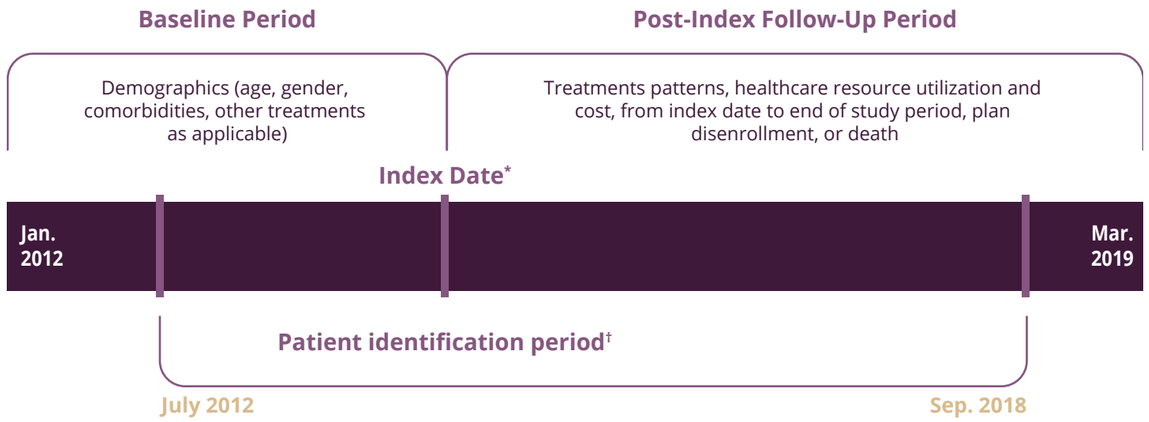
Limitations

- Claims data are not specifically collected for research purposes, and diagnostic and drug-use information are not always validated. As such, there can be missing information that limits the inferences that can be made from the data.
- As an analysis of administrative health care claims data, it does not take into account all clinical information.

Methods[1]

Selection Criteria and Study Design

- Retrospective medical and pharmacy claims study using the IBM® MarketScan® Commercial and Medicare Supplemental Database and Medicaid Database
- Selection Criteria of the HIV+ Study Population



*Defined as first date that all criteria were met between July 1, 2012 and September 30, 2018.
†2012-2013 includes Medicaid only; 2019 includes Commercial/Medicare through March only.

Methods[1] (continued)

Selection Criteria and Study Design (continued)

HIV Population

Total Patients with HIV diagnosis between July 1, 2012 – Sept 30, 2018	**N=196,297**
INCLUSION: ≥2 outpatient claims (>30 days apart) or ≥1 inpatient claim for HIV	**N=153,903**
INCLUSION: Patients ≥18 years of age on the index date	**N=152,256**
EXCLUSION: Patients with any malignancies	**N=146,966**
INCLUSION: Patient continuously enrolled ≥6 months pre- and post-index	**N=42,587**

HIV-associated Wasting Cohort

Cohort: HIV-associated Wasting* *Patients in the HIV-associated Wasting cohort met at least one of A, B, C, or D criteria.*	**HIV+ Study Population** N=42,587 n (%)
A. ≥1 inpatient claim or ≥2 outpatient claim (with same diagnosis code on different service date or combination of any diagnosis below on different dates) with a diagnosis for weight loss	**6,873 (16.1)**
Nutritional marasmus, Other protein-calorie malnutrition, Anorexia nervosa, Abnormal loss of weight and underweight (unintentional weight loss), Feeding difficulties and mismanagement, Failure to thrive, Cachexia, Effects of hunger, Adult neglect (nutritional), Body Mass Index (BMI) <19, adult	
B. A claim for appetite stimulant or non-testosterone anabolic agent	**1,644 (3.9)**
Appetite stimulants (dronabinol, megestrol) and Anabolic agents (oxandrolone, nandrolone, oxymetholone, dehydroepiandrosterone [DHEA], 7-oxo-DHEA, androstenedione)	
C. Evidence of enteral or parenteral nutrition	**776 (1.8)**
Enteral infusion of nutritional substances, Enteral nutrition home therapy, Enteral feeding supplies, Enteral nutrition formula/additives, Enteral nutrition infusion pump, Total parenteral nutrition home therapy, Parenteral nutrition solution/additives, Parenteral nutrition supplies, Parenteral nutrition infusion pump, Aminosyn, Freamine, Procalamine, Travasol	
D. At least two of the following:	**122 (0.3)**
Presence of only one medical claim for weight loss or wasting in the primary or secondary position; Anorexia (≥1 inpatient claim or ≥ 2 outpatient claims at least 30 days apart); A claim for testosterone (and derivatives), growth hormone, thalidomide, or high-calorie nutritional supplements	
Total HIV-associated Wasting Cohort	**7,804 (18.3)**

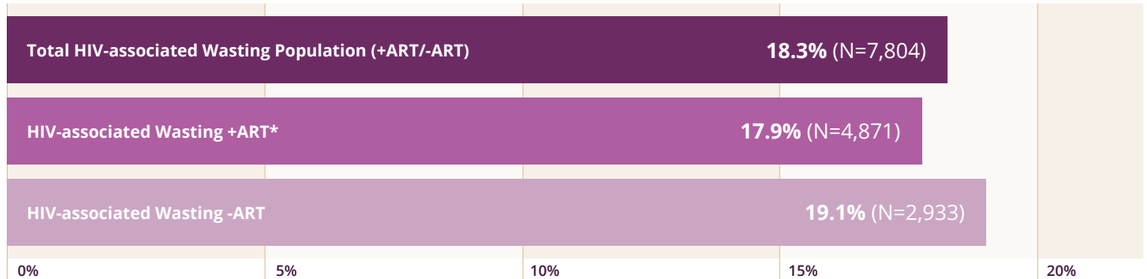
*Patients might have met more than one criterion
Criteria requiring ≥2 outpatient diagnosis claims were required to be on separate service dates

Results[1]

Estimated HIV-associated Wasting Prevalence

- Among the HIV+ Study Population (n=42,587), 64.0% were on ART (n=27,242), 36.0% were not on ART (n=15,345)
- Across the span of the 6 year retrospective medical and pharmacy claims analysis (2012-2018), it was estimated that greater than 1 in 6 people living with HIV in medical care had a medical and/or pharmacy claim of HIV-associated Wasting or cachexia
  - 18.3% of HIV-positive patients were identified as having HIV-associated Wasting
  - 17.9% of patients were on antiretroviral therapy
  - 19.1% were not on antiretroviral therapy

Estimated HIV-associated Wasting Prevalence During a 6 Year Period (2012-2018)



*On ART is defined as ≥1 pharmacy claim of any ART 12-months post-HIV index

Baseline Demographics

A majority of patients in this study were male

- The HIV-associated Wasting cohort was older at HIV index compared to non-HIV-associated Wasting

	non-HIV-associated Wasting N=34,783	Total HIV-associated Wasting N=7,804	HIV-associated Wasting +ART N=4,871	HIV-associated Wasting -ART N=2,933
Male, n (%)	22,700 (65.3)	4,816 (61.7)	2,972 (61.0)	1,844 (62.9)
Age on HIV index date				
Mean (SD)	43.5 (12.5)	46.4 (12.0)	44.6 (11.6)	49.4 (12.3)
18 - 39 years of age, n (%)	12,805 (36.8)	2,100 (26.9)	1,521 (31.2)	579 (19.7)
40 - 64 years of age, n (%)	20,908 (60.1)	5,330 (68.3)	3,295 (67.7)	2,035 (69.4)
65+ years of age, n (%)	1,070 (3.1)	374 (4.8)	55 (1.1)	319 (10.9)
Age at first evidence of HIV-associated Wasting				
Mean (SD)		48.1 (12.2)	46.2 (11.7)	51.4 (12.4)
18 - 39 years of age, n (%)		1,856 (23.8)	1,365 (28.0)	491 (16.7)
40 - 64 years of age, n (%)		5,451 (69.9)	3,384 (69.5)	2,067 (70.5)
65+ years of age, n (%)		497 (6.4)	122 (2.5)	375 (12.8)

Insurance Status

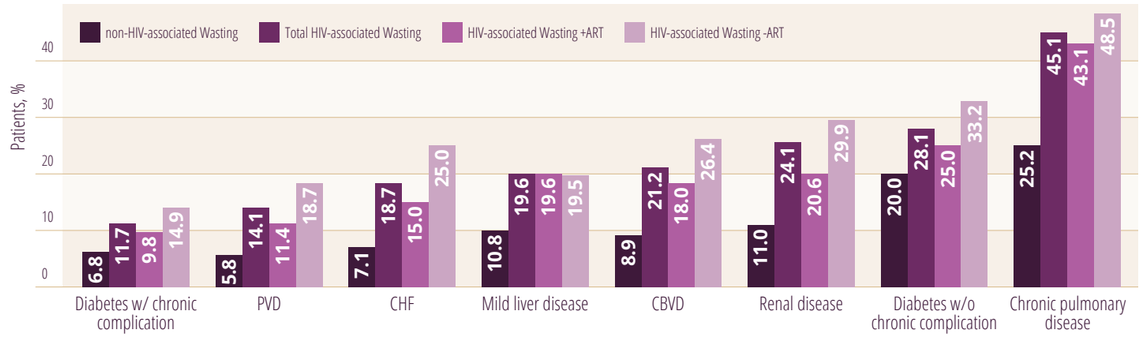
A greater number of people living with HIV-associated Wasting were insured by Medicaid

	non-HIV-associated Wasting N=34,783	Total HIV-associated Wasting N=7,804	HIV-associated Wasting +ART N=4,871	HIV-associated Wasting -ART N=2,933
Commercial, n (%)	12,806 (36.8)	1,040 (13.3)	836 (17.2)	204 (7.0)
Commercial and Medicare supplement Population Region, n (%)*	**n=12,806**	**n=1,040**	**n=836**	**n=204**
Northeast	2,367 (18.5)	166 (16.0)	112 (13.4)	54 (26.5)
North Central	1,530 (12.0)	127 (12.2)	97 (11.6)	30 (14.7)
South	7,184 (56.1)	612 (58.8)	505 (60.4)	107 (52.5)
West	1,706 (12.8)	133 (12.8)	120 (14.4)	13 (6.4)
Unknown	19 (0.2)	2 (0.2)	2 (0.2)	0 (0)
Medicaid, n (%)	**21,977 (63.8)**	**6,764 (86.7)**	**4,035 (82.8)**	**2,729 (93.0)**
Medicare Dual eligible,† n (%)	9,090 (41.4)	2,597 (38.4)	536 (13.3)	2,061 (70.3)
Race for Medicaid Population, n (%)*	**n=19,248**	**n=5,960**	**n=4,035**	**n=2,729**
White	4,701 (24.4)	1,576 (26.4)	913 (26.3)	663 (24.3)
Black	14,066 (73.1)	4,274 (71.7)	2,477 (71.4)	1,797 (65.8)
Hispanic	286 (1.5)	61 (1.0)	49 (1.4)	12 (0.4)
Other	195 (1.0)	49 (0.8)	29 (0.8)	20 (0.7)

P-values for non-HIV-associated-Wasting versus HIV-associated Wasting were all <0.0001
*There were missing values in each group, region was only available in the Commercial and Medicare Supplemental databases and race was only available in the Medicaid database
†People who are dual eligible qualify for both Medicare and Medicaid benefits

Comorbidities

- The HIV-associated Wasting cohort had significantly higher comorbidity burden with Charlson Comorbidity Index (CCI)* mean (SD) compared to non-HIV-associated Wasting: 3.6 (3.0) vs. 2.0 (2.2)
  - Nearly all Charlson comorbidities were more common in the HIV-associated Wasting cohort compared with the non-HIV-associated Wasting cohort
- Patients within the HIV-associated Wasting cohort had higher proportions of metabolic disorders

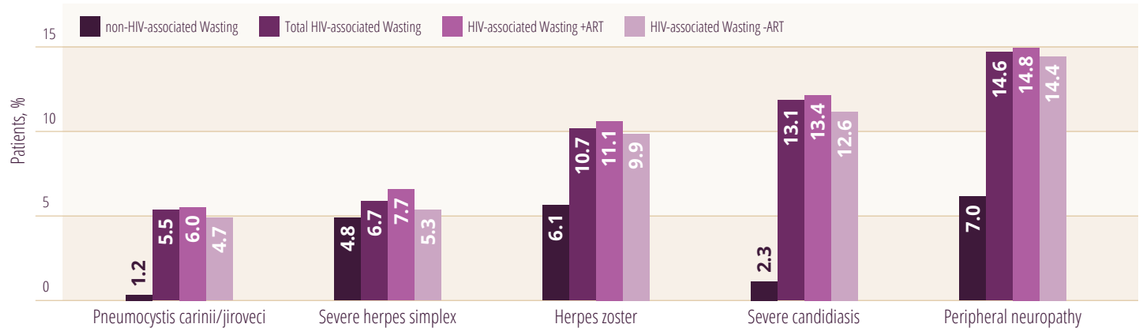


*The Charlson Comorbidities Index is a validated health status assessment based on a summary score of 17 comorbidities (rated from 1 to 6 for mortality risk and disease severity).[2]
Only those Charlson comorbidities with frequency >10% are presented in the bar chart; P-value <0.0001 for all comparisons
CCI=Charlson Comorbidity Index; PVD=Peripheral vascular disease; CHF=Chronic heart failure; CBVD=Cerebrovascular disease

Results[1] (continued)

Select HIV/AIDS Conditions and Opportunistic Infections

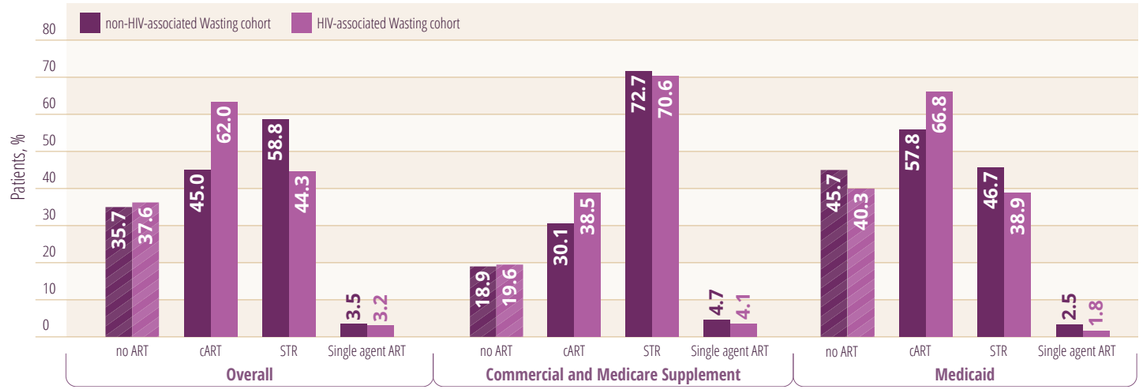
- The HIV-associated Wasting cohort had higher proportions of opportunistic infections (OI) and HIV/AIDS-related conditions compared to the non-HIV-associated Wasting cohort
  - 64.3% of the HIV-associated Wasting cohort had ≥1 diagnosis of an OI vs. 38.6% in the non-HIV-associated Wasting cohort, p<0.0001
- Within the HIV-associated Wasting cohort, the HIV-associated Wasting +ART cohort were more likely to have ≥1 diagnosis of an OI compared to the HIV-associated Wasting –ART cohort (66.0% vs. 61.3%, respectively)



Only those conditions with proportion >5% are presented in the bar chart; P-value <0.0001 for all comparisons

ART Utilization at HIV Index

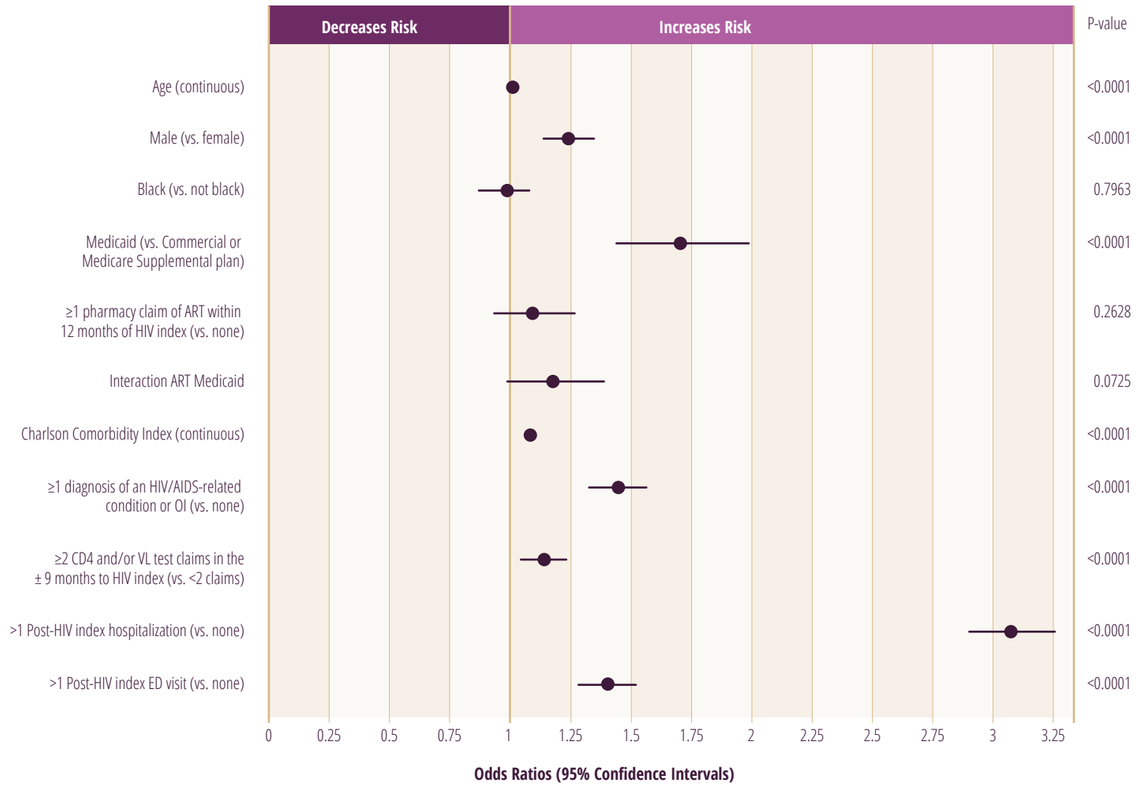
- At HIV-index* date, >35% of people living with HIV had no evidence of a pharmacy claim and >45% of people living with HIV in the Medicaid population, who were untreated, had no evidence of a pharmacy claim for ART
- cART† was the most common treatment overall, within the Medicaid population and HIV-associated Wasting cohort; whereas STR was most common in the Commercial and Medicare Supplement population and non-HIV-associated Wasting cohort



*At index includes medications used 12-months post-HIV index; cART is defined as any fixed-dose combinations (FDC) OR >2 single agents
†cART is defined as any fixed dose combination or greater than, or equal to, 2 single agents
cART - Combination antiretroviral therapy; STR – single tablet regimen

Correlates of HIV-associated Wasting

- In logistic regression analysis, race and ART status were not found to be correlates of HIV-associated Wasting
- The strongest associations with HIV-associated Wasting were with Medicaid insurance and hospitalization(s) post-HIV index



Claims for CD4 and viral load tests were a surrogate marker for being in care

Conclusion

This analysis indicates that HIV-associated Wasting exists in the era of modern antiretroviral therapy. HIV-associated Wasting also increases with age and is associated with a significant comorbidity burden. Further research is needed to understand these relationships.

Visit HIVWasting.com for more information about HIV-associated Wasting

Statistical Analysis

- Prevalence of HIV-associated Wasting
  - Cumulative prevalence was estimated for the study period (2012-2018) and reported in terms of frequencies and percentages
- Unadjusted bivariate analyses compared demographic and clinical characteristics
  - Student's t-tests or Wilcoxon rank-sum tests were used for continuous variables and reported in terms of means, standard deviations (SD), medians, and ranges
  - Chi-square tests were used for categorical variables and reported in terms of frequencies and percentages
- Correlates of HIV-associated Wasting
  - Multivariate logistic regression analyses were conducted to assess demographic and clinical correlates of HIV-associated Wasting

References: 1. Siddiqui, J. et al (2021). HIV-associated Wasting remains an underappreciated comorbidity with HIV in the era of modern ART. Presented at Miami Center for AIDS Research (CFAR) - HIV & Aging in the Era of ART and COVID-19 February 8-9, 2021 (Virtual). **2.** Roffman CE, Buchanan J, Allison GT. Charlson comorbidities index. *J Physiother.* 2016;62(3):171.

EMD Serono