

### Burden of Hypertension, Diabetes, Cardiovascular Disease, and Lung Disease Among Women Living With Human Immunodeficiency Virus (HIV) in the United States

TO THE EDITOR—We read Collins et al's recent study with great interest [1]. The study provides exceptional insight into the aging of women living with human immunodeficiency virus (HIV; WLWH), a sorely underrepresented demographic in HIV-related research [2, 3]. We were intrigued, however, that the authors did not observe a difference in prevalent hypertension, diabetes, cardiovascular, and lung disease by HIV serostatus and wondered whether a similar pattern would be observed in a large, US population database.

We performed a cross-sectional analysis using a multi-health system electronic medical record analytics platform (Explorys; IBM Watson Health, Cambridge, MA, USA). At present, the database contains 64 million patients, representing 15% of the population across all 4 US census regions. Patients with all types of insurance as well as those who are self-pay are represented.

Our cohort included female adults (age  $\geq 18$  years) with HIV infection (requiring

a combination of ICD-9 code and antiretroviral treatment, sensitivity 77%, specificity 100%) and an active status in the database during 21 April 2015 to 21 April 2020 [4]. Comorbidities were defined by SNOMED-CT terms corresponding to the following ICD-9 codes: hypertension (401), type 2 diabetes mellitus (250), cardiovascular disease (410, 411, 413, 433–436), and lung disease (491–493, 496). The specificity of the ICD-9 codes ranged from 84 to 97% [5, 6]. Patients missing information on age, sex, or race were excluded from analysis. Patient counts are reported by the database to the nearest 10 to maintain confidentiality.

We identified 10 590 WLWH (63% Black, 89%  $<65$  years) and 14 546 020 HIV-seronegative women controls (77% White, 14% Black, 71%  $<65$  years). Hypertension (49% vs 31%), diabetes (22% vs 12%), cardiovascular disease (13% vs 7%), and lung disease (36% vs 17%) were more common in WLWH in the overall cohort as well as within all age subgroups (Table 1). After adjusting for age and race, WLWH had significantly higher prevalence of hypertension (prevalence ratio [PR], 1.37; 95% confidence interval [CI], 1.35–1.40), diabetes (PR, 1.48; 95% CI, 1.43–1.53), cardiovascular

disease (PR 2.05; 95% CI, 1.96–2.15), and lung disease (PR 2.06; 95% CI, 2.01–2.11) than women without HIV.

These findings provide evidence for increased prevalent hypertension, diabetes, cardiovascular disease, and lung disease in WLWH when compared to the general US healthcare-seeking population. Our data are contrary to Collins et al but not surprisingly. The seronegative-HIV women in the WIHS cohort are at risk of HIV acquisition and share the same complex interplay of lifestyle risk factors seen in those with HIV. As the authors comment and Husman et al reflect in their commentary, the poor overall health of the HIV-seronegative women in the Women's Interagency HIV Study (WIHS) may have mitigated differences [7]. Furthermore, our data, consistent with Collins et al, suggest WLWH accrue chronic diseases at an earlier age than seronegative counterparts.

Our study is limited from potential misclassification and detection bias that are inherent to the use of ICD-9 codes and a cohort more likely to seek care, respectively. However, the use of validated case definitions and data from one of the largest and most ethnically diverse WLWH cohorts may overcome these biases.

**Table 1. Frequency of Hypertension, Diabetes, Cardiovascular Disease, and Lung Disease in Women Stratified by Human Immunodeficiency Virus (HIV) Serostatus and Age Group**

Comorbidity	18–44		45–64		65+	
	HIV+ no. (%)	HIV– no. (%)	HIV+ no. (%)	HIV– no. (%)	HIV+ no. (%)	HIV– no. (%)
HTN	940 (27)	432,490 (8)	3,310 (56)	1,492,890 (33)	930 (78)	2,616,330 (62)
T2DM	390 (11)	188,210 (3)	1,490 (25)	582,260 (13)	440 (37)	999,270 (24)
CVD <sup>a</sup>	180 (5)	49,120 (1)	900 (15)	256,470 (6)	340 (29)	755,180 (18)
LD <sup>b</sup>	990 (29)	755,530 (13)	2,340 (40)	749,850 (16)	500 (41)	922,740 (21)

Abbreviations: CVD, cardiovascular disease; HTN, hypertension; LD, lung disease; T2DM, type 2 diabetes mellitus.

<sup>a</sup>CVD entails ICD-9 codes: 410, 411, 413, 433, 434, 435, 436.

<sup>b</sup>LD entails ICD-9 codes: 491, 492, 493, 496.

## Note

**Potential conflicts of interest.** The authors: No reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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