

Economic Burden, Hospitalization Rates, and Predictors of Delayed Diagnosis Among US Adults With HIV

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Conclusions

- According to an analysis of US claims from 2013-2024, more than 25% of people with HIV (PWH) had late diagnosis, defined here as having or developing AIDS or an HIV-related comorbidity within a year of diagnosis
- Late diagnosis was associated with higher baseline healthcare costs and higher healthcare costs during each of years 1-3 post-diagnosis versus the overall population with HIV
- Late diagnosis was more common among PWH who were older, had a higher comorbidity burden, those who smoked, and those who were diagnosed with HIV by an emergency medicine physician rather than an infectious disease specialist, whereas primary care physicians were less likely to diagnose HIV late
- Policies facilitating early testing and linkage to care for those diagnosed with HIV and prevention efforts are needed to end the HIV epidemic

Plain Language Summary

- In a large US claims database, just over 1 in 4 people with HIV had or developed AIDS or HIV-related complications within 1 year of their HIV diagnosis, defined here as a “late diagnosis”
- The late diagnosis group had substantially higher healthcare costs and hospitalizations compared to the overall population with HIV
- Late diagnosis was more common for people with HIV who were older, those who had other medical conditions in addition to HIV, those who were smokers, and those who were diagnosed with HIV by an emergency physician rather than an HIV specialist; primary care physicians were less likely to diagnose HIV late

Introduction

- The economic burden of HIV is substantial¹ and research suggests that costs are especially high for PWH who are diagnosed at later stages of the disease.^{2,3} However, the economic burden of HIV immediately after diagnosis has not been well-characterized for those diagnosed at later stages of disease.

Methods

- This retrospective observational cohort study used administrative healthcare claims data from the IQVIA PharMetrics® Plus database to evaluate HCRU and costs among PWH before and after initial HIV diagnosis
- Inclusion/exclusion criteria:
 - Adults age ≥18 years old with at least 1 year of continuous enrollment at baseline and 3 years of continuous enrollment at follow-up with evidence of a new HIV diagnosis:
 - ≥1 inpatient claim for HIV-1 diagnosis, or
 - ≥2 outpatient claims for HIV-1 diagnosis ≥30 days apart, with ≥1 claim not coinciding with an HIV screening test date, or
 - ≥1 outpatient claim with HIV diagnosis and ≥1 prescription claim for antiretroviral therapy (ART) on or after the diagnosis claim
 - Individuals were excluded if they had evidence of HIV-1/HIV-2 or ART (excluding pre-exposure prophylaxis) prior to the index diagnosis or data quality issues (missing age or sex)
- All-cause costs and healthcare resource utilization were compared for the 1-year baseline period and each of the first 3 years of follow-up for the late diagnosis group and the overall group with HIV (**Figure 1**)
- Since CD4 cell count data was not available, in this study late diagnosis was defined as having or developing AIDS or HIV-related complications within 1 year of the index HIV diagnosis, which is broader than the clinical definition typically used based on presentation with CD4 count <350 cells per µL or an AIDS-defining event⁴

Results

- Among 2,370 PWH included in this study, 651 (27.5%) had a late diagnosis. For the late diagnosis subgroup, the average age was 47.9 ± 14.9 years, 68.8% were male, 49.6% had commercial insurance, and 35.8% had Managed Medicaid (**Table 1**).

Table 1. Demographics and Clinical Characteristics Among People With HIV and the Subgroup With Late Diagnosis

Demographic and clinical characteristics	PWH N = 2,370	Late Diagnosis N = 651
Age, years, mean (SD)	45.4 (14.6)	47.9 (14.9)
Sex, n (%)		
Male	1,746 (73.7)	448 (68.8)
Female	624 (26.3)	203 (31.2)
Region, n (%)		
Northeast	691 (29.2)	208 (32.0)
Midwest	527 (22.2)	140 (21.5)
South	644 (27.2)	183 (28.1)
West	508 (21.4)	120 (18.4)
Residence in EHE county	1,204 (50.8)	323 (49.6)
Payer type		
Commercial	1,254 (52.9)	323 (49.6)
Managed Medicaid	871 (36.8)	233 (35.8)
Medicare Advantage	158 (6.7)	71 (10.9)
Self-insured	78 (3.3)	23 (3.5)
Charlson comorbidity index (CCI) excluding AIDS, mean (SD)	0.6 (1.5)	1.2 (2.1)

CCI, Charlson comorbidity index; EHE, Ending the HIV Epidemic; PWH, people with HIV; SD, standard deviation.

- For the late diagnosis subgroup, median (IQR) annual all-cause total costs were \$4,325 (\$22,109) at baseline, compared to \$49,514 (\$66,276) at year 1 post-diagnosis, \$37,158 (\$43,011) at year 2, and \$35,899 (\$45,715) at year 3, substantially higher during baseline and every year of follow-up compared to the overall HIV cohort (**Figure 2**).
- Prevalence of hospitalization was 25.6% at baseline, 56.7% at year 1, 19.0% at year 2, and 17.4% at year 3 for the late diagnosis subgroup, substantially higher than the overall PWH population with 13.4% hospitalized at baseline, 27.0% at year 1, 11.6% at year 2, and 12.2% at year 3.
- In a regression model, those with older age, higher Charlson Comorbidity Index score, and smoking were more likely to have late diagnosis; late diagnoses were more likely to be diagnosed by an emergency medicine physician and less likely to be diagnosed by a primary care physician compared to an infectious disease specialist (**Table 2**).

Median healthcare costs were substantially higher for the late diagnosis subgroup than the overall population with HIV, both at baseline and at each year of follow-up

Limitations

- Due to the lack of clinical data available within claims databases, our definition of late diagnosis was based exclusively on presence of ICD-9/10 codes for HIV-related comorbidities within a year of diagnosis, which could have resulted in overestimates or underestimates compared to clinical definitions based on CD4 counts; potential misclassification of late diagnosis could therefore have impacted HCRU and cost estimates in this group

Objective

- The objective of this study was to measure the healthcare resource utilization (HCRU) and healthcare costs for PWH in the 3 years post-diagnosis compared to the year pre-diagnosis, describing both those with late HIV diagnosis and the general population with HIV

Figure 1. Study Schematic

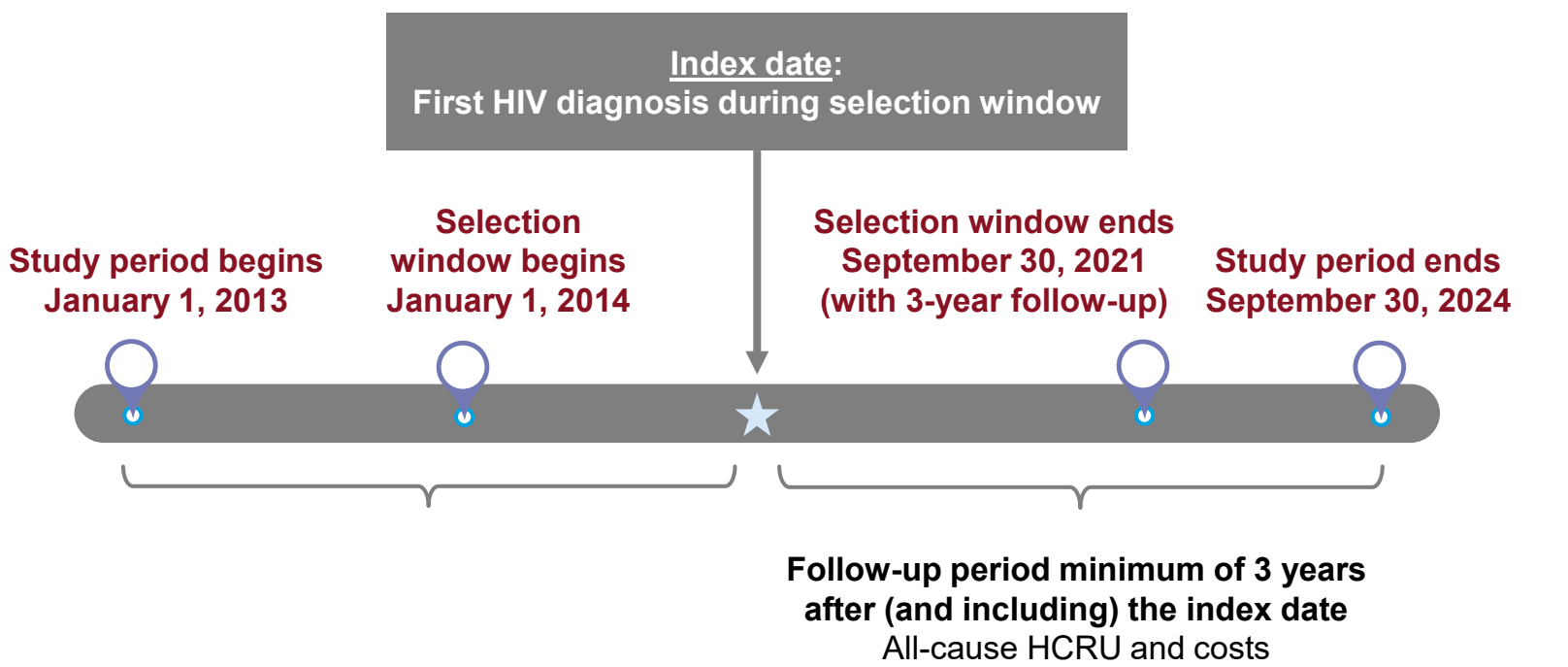


Figure 2. Median All-Cause Healthcare Costs Among People With HIV and the Subgroup With Late Diagnosis Who Had Either AIDS or an AIDS-Defining Condition at Index or During the First Year of Follow-Up

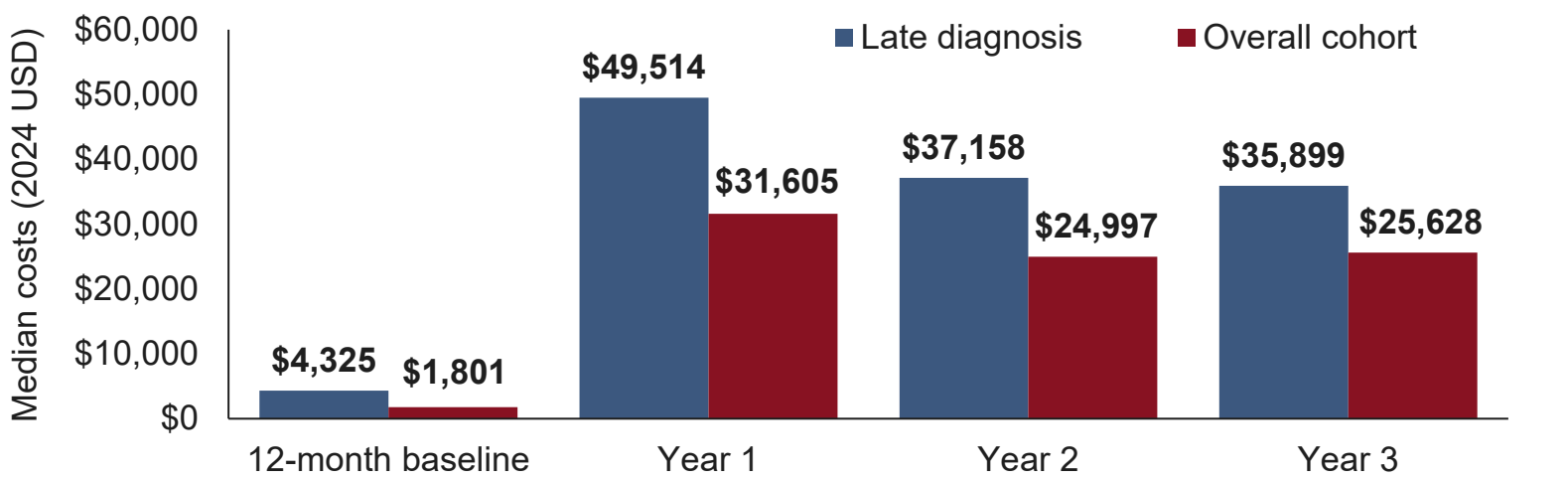


Table 2. Factors Associated With Late Diagnosis Among the Overall Population With HIV

Factors associated with Late Diagnosis	Adjusted odds ratio	95% CI		P value ¹
		Lower	Upper	
Age groups (ref: 18-24 years)				
25-34	1.318	0.872	1.994	0.191
35-44	1.307	0.871	1.961	0.196
45-54	1.500	1.009	2.230	0.045*
55-64	1.531	1.017	2.304	0.041*
≥65	1.420	0.828	2.438	0.203
Sex (ref: male)	1.223	0.978	1.530	0.077
Payer type (ref: commercial)				
Managed Medicaid	0.867	0.682	1.101	0.242
Managed Medicare	1.380	0.896	2.125	0.144
Physician specialty (ref: Infectious disease specialist)				
Primary care physician	0.746	0.562	0.992	0.044*
Hospitalist	1.181	0.878	1.589	0.270
Emergency Medicine Physician	2.403	1.472	3.923	0.001*
Other/unknown	1.035	0.791	1.354	0.805
CCI score (ref: 0)				
1	1.373	1.034	1.824	0.029*
2	2.611	1.744	3.909	<.0001*
≥3	3.387	2.229	5.146	<.0001*
Smoking (ref: no)	1.697	1.281	2.248	0.000*

*Indicates p<0.05. Geographic region and specific comorbidities (alcohol/drug abuse, anxiety, chronic pain/fibromyalgia, depression, diabetes mellitus, dyslipidemia, hypertension) were also included in the model but were not statistically significantly associated with late diagnosis. P value derived from multivariable generalized linear model with a log link function and gamma distribution. CCI, Charlson Comorbidity Index.

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