

HEALTH-RELATED COSTS IN CHRONIC HIV INFECTION: A CASE-CONTROL STUDY VS. GENERAL POPULATION USING A CLAIMS-BASED APPROACH IN GERMANY

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BACKGROUND and OBJECTIVE

Antiretroviral therapy (ART) has increased life expectancy of people living with HIV (PLHIV), transforming HIV management into chronic care^[1]. In ageing PLHIV, the prevalence of comorbidities is increasing^[2,3], and represents a high burden to the health systems^[4]. However, data on excess non-AIDS related financial burden in PLHIV is scarce.

This study aimed to characterize the different types of non-AIDS related costs to the German health system, and the prevalence of non-AIDS related comorbidities in an HIV population compared to a matched non-HIV cohort from the general population in Germany.

MATERIALS AND METHODS

This is a retrospective matched case-control study using health insurance claims data (Health risk Institute Research Database), comparing the prevalence of comorbidities and the healthcare costs in an HIV cohort to a matched cohort from the general population without HIV (non-HIV).

Inclusion criteria for the HIV cohort were:

- ≥1 HIV ICD-10-GM code in 2014,
- age ≥ 18 years in 2011 and continuous documentation for the following 3 years (index date was the last available HIV ICD-10 code for HIV in 2014).

A control cohort was selected from a general, non-HIV population, and paired (using a 2:1 control-to-case ratio) based on age, gender, residence district, health insurance status, and educational level at index date and followed on the previous 12 months.

A sub-groups analysis was conducted to characterize comorbidities in HIV patients on ART and not on ART matched with non-HIV patients.

Treatment and cost analyses were conducted within the quarter with the latest observable HIV ICD-10 code for HIV in 2014 and the previous 3 quarters.

Descriptive statistics were used to characterize data, Mann-Whitney-Wilcoxon test was used to compare mean healthcare costs, and chi-square tests were computed to detect differences in comorbidities between HIV patients and non-HIV patients, at a significance level of 0.05. Costs exclusively related to HIV treatment (ART) were analysed separately.

RESULTS

A total of 1,969 HIV patients who met the inclusion criteria were matched with 3,938 individuals of the non-HIV cohort (Table 1). Mean age was 48.3 years (standard deviation, SD ± 12.2) and 83.5% were males for both groups. The majority of HIV patients (76.3%) were on combination ART. Mean number of comorbidities and per patient per year (PPPY) total costs were both higher for the HIV cohort compared to matched non-HIV cohort, but the latter was largely due to ART.

Prevalence of comorbidities was higher in the HIV cohort compared to the matched non-HIV cohort for: cardiovascular disease (CVD) – 12.8% vs. 10.4% (p=0.0056); chronic renal disease (CKD) – 4.3% vs. 2.4% (p<0.001) and osteoporotic bone fractures – 6.4% vs. 2.1% (p<0.0001). Despite the higher CVD prevalence in HIV patients, the prevalence for hypertension, type II diabetes and dyslipidemia were lower or similar for HIV patients when compared to non-HIV matches (Figure 1).

Overall, the mean PPPY costs not related with HIV treatment were significantly higher in the HIV cohort compared to the matched non-HIV cohort (8,049€ vs 3,658€, respectively; p<0.05). These were mainly driven by non-ART related pharmaceutical costs (+2,747€; p<0.05) and outpatient costs (+1,441€; p<0.05). Costs for devices and aids, and sick leave payments were higher in the non-HIV cohort, but these represent a small fraction of the total PPPY cost (Figure 2). This was observed regardless of ART status (Table 2), except for sick leave payments, which were – in comparison to the matched cohort - only higher for the HIV cohort not on ART.

For all age groups, PPPY costs were higher for the HIV cohort compared to the non-HIV cohort, and in general, tend to increase with age for both groups, being especially high ≥ 60 years old. In the non-HIV cohort, this increase was mainly driven by inpatient costs and in the HIV cohort, by the increase in pharmaceuticals excluding ART, inpatient and outpatient costs (Figure 2).

Table 1: Patient characteristics of the matched HIV cohort and the matched non-HIV cohort

	HIV cohort N = 1,969	Matched non-HIV cohort N = 3,938	
Age, years [mean (SD)]	48.3 (12.2)	48.3 (12.2)	
Age groups, years [n (%)]			
21 - 39 years	486 (24.7%)	927 (24.7%)	
40 - 59 years	1,158 (58.8%)	2,316 (58.8%)	
≥60 years	325 (16.5%)	650 (16.5%)	
Male [n (%)]	1,644 (83.5%)	3,288 (83.5%)	
Comorbidities per patient [mean (SD)]	1.0 (1.3)	0.8 (1.3)	
Education level [n (%)]			
No degree or completed vocational training	89 (4.5%)	178 (4.5%)	
Technician certificate, master craftsman certificate	976 (49.6%)	1,952 (49.6%)	
Bachelor's degree or master's degree or doctoral degree	643 (32.7%)	1,286 (32.7%)	
Unknown degree	261 (13.3%)	522 (13.3%)	
ART [n (%)]			
On ART	1,756 (83.4%)	-	
Not on ART	352 (17.9%)	-	
PPPY Cost [€]		P-value	
ART costs [mean (SD)]	16,441€ (11,310€)	-	
Other pharmaceutical costs excl. ART [mean (SD)]	3,942€ (39,654€)	1,195€ (16,440€)	<0.05
Other costs, non-pharmaceutical			
inpatient costs [mean (SD)]	1,492€ (5,863€)	1,171€ (9,788€)	<0.05
outpatient costs [mean (SD)]	2,147€ (2,796€)	706€ (1,582€)	<0.05
sick leave payments costs [mean (SD)]	174€ (1,407€)	178€ (1,423€)	0.337
devices and aids costs [mean (SD)]	294€ (1,650€)	407€ (2,831€)	<0.05
Total costs including ART [mean (SD)]	24,490€ (45,753€)	3,664€ (20,961€)	<0.05

Legend: ART, antiretroviral therapy; SD, standard deviation; PPPY, per patient per year.

Table 2: Mean healthcare costs in the HIV cohort and the matched non-HIV cohort, in the previous 12 months

	HIV with ART/non-HIV		P-value	HIV without ART/non-HIV		P-value
	HIV cohort with ART N = 1617	Matched non-HIV cohort N = 3234		HIV cohort without ART N = 352	Matched non-HIV cohort N = 704	
Inpatient costs (€)	1,407 €	1,118 €	<0.05	1,884 €	1,413 €	<0.05
Outpatient costs (€)	2,117 €	708 €	<0.05	2,283 €	696 €	<0.05
Total pharmaceuticals costs excl. ART (€)	4,135€	1,302€	<0.05	3,057€	708€	<0.05
Costs for Devices and aids (€)	282 €	422 €	<0.05	348 €	339 €	0.633
Sick leave payments (€)	139 €	181 €	0.137	334 €	165 €	0.379
Total costs excl. ART (€)	8,080€	3,731€	<0.05	7,906€	3,322€	<0.05

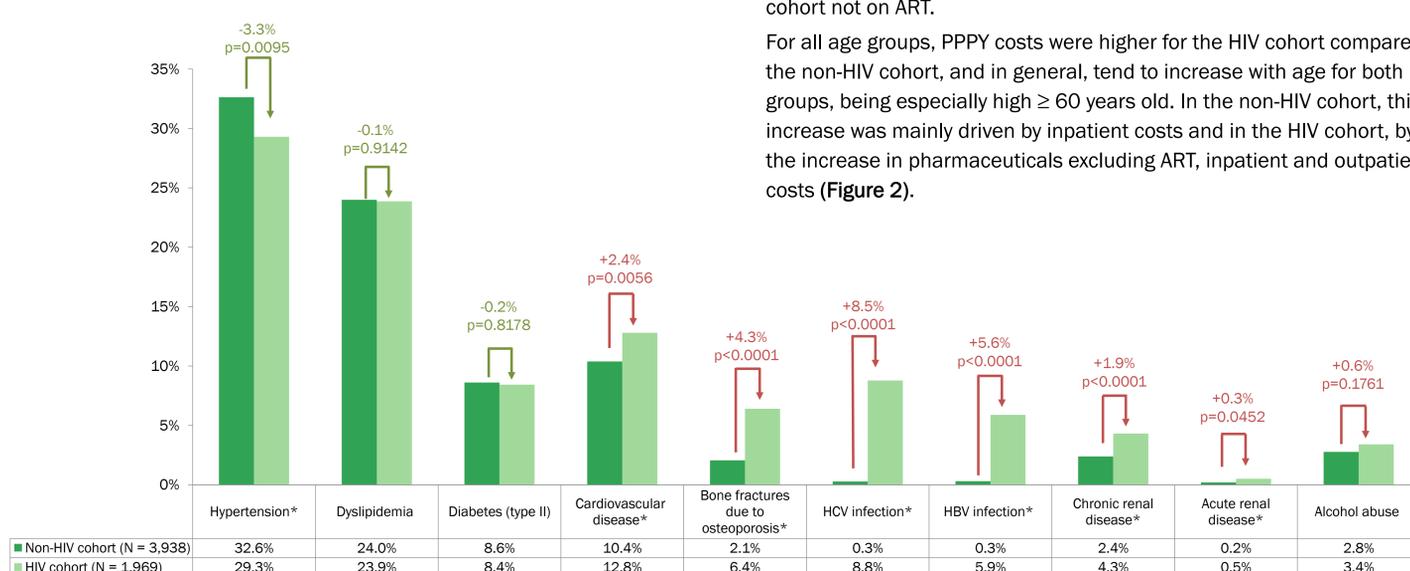


Figure 1 - Prevalence of comorbidities in the HIV cohort and in the matched non-HIV cohort over the previous 12 months

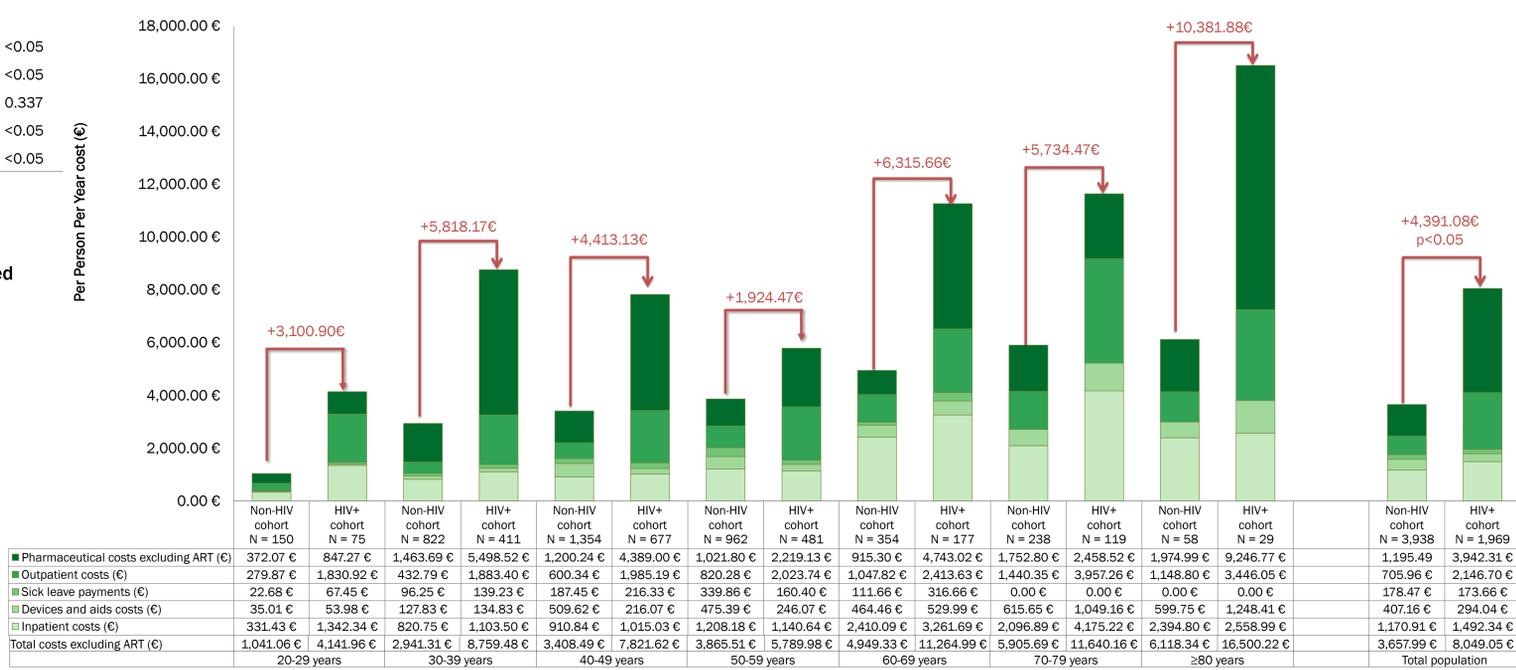


Figure 2 - Healthcare costs in the HIV cohort and in the matched non-HIV cohort over the previous 12 months, according to age group and in the total population

CONCLUSION

Overall, PPPY costs not related with HIV treatment (inpatient, outpatient and drug related costs not associated with ART) are higher in the HIV cohort compared to the general population, potentially reflecting the higher burden of comorbidities observed in the HIV population (such as cardiovascular diseases, chronic renal disease and bone fractures due to osteoporosis). PPPY costs tend to increase with age for both groups, but are generally higher for HIV patients. This is particularly visible for patients over 60 years old, when the PPPY costs significantly increase for the HIV population.

Therefore, an adequate HIV management including regular monitoring, screening for comorbidities and optimal ART selection, remain critical to achieve continuous improvement of PLHIV health status and reduce the financial burden for the German healthcare system.

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