



Changing direct costs of HIV treatment since the introduction of HAART in the Netherlands

JA Bogaards¹, MGW Dijkstra², JM Prins³, F de Wolf^{1,4}

¹HIV Monitoring Foundation, Amsterdam, Netherlands, ²Dept. Clinical Epidemiology & Biostatistics and ³Dept. Internal Medicine, Academic Medical Center, University of Amsterdam, Amsterdam, Netherlands, ⁴Dept. Infectious Disease Epidemiology, Faculty of Medicine, Imperial College, London, UK

Background

Tremendous savings in hospital-based AIDS care have been reported over the first few years since HAART became widely available in 1996. However, longer term HAART may result in increasing costs, due to toxicity of antiretroviral regimens and development of viral resistance and subsequent therapy failure. We determined whether the direct costs of HIV treatment have changed over recent years.

Methods

Data were derived from the national HIV Monitoring Foundation, which registers all patients treated with HAART in the Netherlands and collects data on the use of antiretroviral drugs and co-medication, as well as data on immunological and virological markers of HIV infection. In addition, we determined outpatient and inpatient hospital care consumption in the target of the 25 HIV treatment centres in the Netherlands, the Amsterdam Academic Medical Center (AMC). Standard costing procedures were used wherever possible, based on Dutch pharmacotherapeutic and health insurance guidelines. Costs (adjusted to 2002 euros) were expressed per person-year of follow-up after initiation of HAART for each half year up to July 2003.

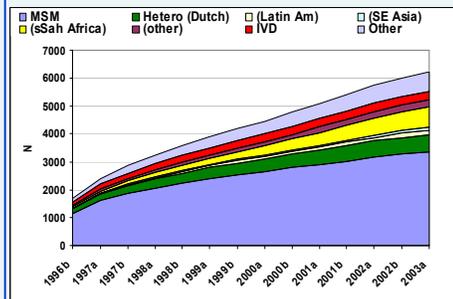
Results

As of July 2003, 7000 patients had initiated HAART, 1381 in the AMC. The national expenditure on HAART regimens has increased more than fivefold over the course of seven years, but expenditure per person-year of HAART has increased only modestly from € 8800 in 1996 to € 9600 in 2000 and has remained stable since. Costs of hospital resources decreased from over € 5000 in 1996 to € 2600 in 2000 and further declined to € 2300 in the first half of 2003. Subgroup analyses indicated that the costs of inpatient hospital care and expenditure on co-medication have increased recently among patients who started HAART in 1997. The costs of treatment were markedly high during the first year of HAART among patients who initiated therapy in 2000.

Conclusions

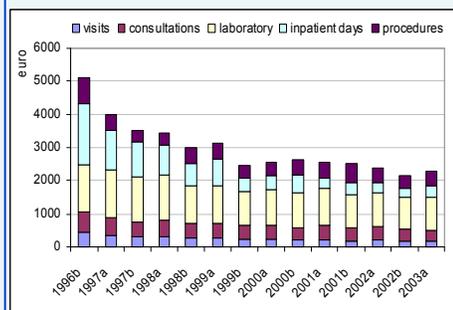
On a population level, the per capita costs of HAART in the Netherlands have continued to decrease up to July 2003, but seemed to have reached a nadir. Long-term use of HAART is associated with increased expenditure on inpatient hospital resources and initiation of HAART appears more expensive recently than previously reported.

Figure 1: Prevalence of HAART use in the Netherlands from July 1996 until July 2003



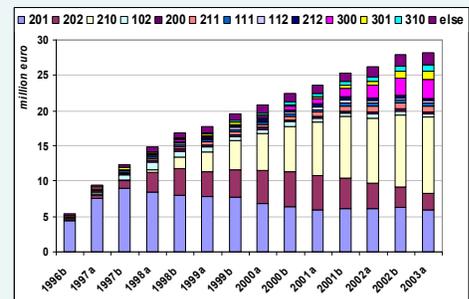
MSM (men who have sex with men): infected via homosexual transmission; Hetero: infected via heterosexual transmission (region of origin in brackets); IVD: infected via intravenous drug use; Other: includes unknown routes of transmission. First and second half of each year is indicated by a and b, respectively. Prevalence estimates include all patients who initiated HAART before the end of the interval or had initiated HAART before and were still in follow-up by the beginning of the interval.

Figure 3: Costs of hospital resource use per person-year of follow-up after initiating HAART



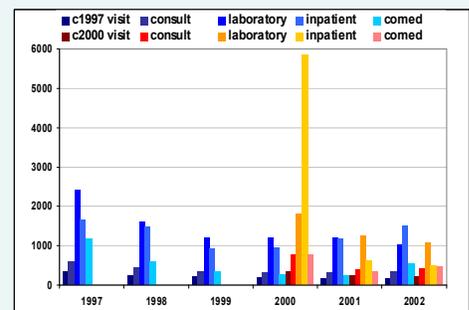
Cost estimates for (outpatient clinic) visits are based on the subgroup of patients who were treated with HAART in the AMC (N=1381; 5490 person-years of follow-up after initiating HAART). Cost estimates for consultations, inpatient days and (diagnostic and therapeutic) procedures are based on those patients for whom data on inpatient hospital care consumption was available (N=599; 2894 person-years of follow-up after initiating HAART). Laboratory costs include most common serological, haematological, virological and immunological measurements, with estimates based on all patients in follow-up with SHM (see Figure 1 for numbers). First and second half of each year is indicated by a and b, respectively.

Figure 2: Total costs of HAART regimens in the Netherlands from July 1996 until July 2003



HAART regimens are coded as follows: the first figure denotes the number of NRTI's included, the second the number of nNRTI's and the third figure denotes the number of PI's included, e.g. 210: 2 NRTI's + 1 nNRTI; 102: 1 NRTI + 2 PI's. First and second half of each year is indicated by a and b, respectively. Numbers of patients for each half year are as in Figure 1.

Figure 4: Costs (in euros) of hospital-based care for HIV-infected patients treated in the Amsterdam Academic Medical Center (AMC) per person-year after initiating HAART in 1997 or in 2000.



C1997: cohort of patients who initiated HAART in 1997 in the AMC. Cost estimates for outpatient care (clinic visits, laboratory measurements and comed) are based on the entire group of patients (N=223; 1331 person-years of follow-up after initiating HAART), while cost estimates for inpatient care (consult: consultations, inpatient: inpatient days plus procedures) are based on those patients for whom data on inpatient hospital care consumption was available (N=123; 757 person-years of follow-up after initiating HAART). Numbers for the 2000 cohort are N=125 (402 person-years of follow-up after initiating HAART) for outpatient care and N=29 (87 person-years of follow-up after initiating HAART) for inpatient care.

Table 1: Antiretroviral drug prices in the Netherlands

NRTI		nNRTI		PI	
Drug	€/ day ^s	Drug	€/ day ^s	Drug	€/ day ^s
zidovudine	8.9	nevirapine	9.0	indinavir	9.2
didanosine	7.4	efavirenz	9.3	saquinavir hard	9.4
zalcitabine	5.7			saquinavir soft	9.2
stavudine	8.6			ritonavir pill	13.7
lamivudine	6.6			ritonavir drink	14.1
abacavir	10.2			nelfinavir	11.7
tenofovir [#]	13.0			amprenavir	15.2
Average	8.6	Average	9.2	Average	11.8

^sall prices in 2002 euros

[#]nucleotide analogue reverse transcriptase inhibitor

†zidovudine/lamivudine; ‡zidovudine/lamivudine/abacavir; ¶lopinavir/ritonavir

Table 2: Average costs of HIV treatment for HAART-treated patients in 1997 and 2002

Cost component	Volume 1997		Volume 2002	
	Frequency	Cost [*]	Frequency	Cost [*]
Outpatient care				
AIDS-treating physician [†]	5.8	322	3.4	190
Hospital pharmacy [†]	2.3	101	4.9	255
Other specialists [†]	9.0	395	2.4	125
Laboratory measurements				
Plasma viral load [†]	4.6	844	3.5	644
T lymphocyte counts [‡]	5.2	429	2.9	239
Other blood measurements [‡]	3.5	114	3.4	111
Inpatient care				
Daycare treatment [†]	0.24	49	0.07	13

^{*} per person-year of follow-up after initiating HAART

^{**} all prices adjusted to 2002 euros

[#] using standard cost prices, weighted for academic/non-academic hospitals 13, 14

† using cost prices as calculated previously, based on data available in the AMC 11

‡ includes days in psychiatric hospital ward

§ includes differential haematology and clinical chemistry, using standard tariffs derived from national registries

¶ using tariffs for diagnostic and therapeutic procedures recommended by the Dutch health insurance guidelines

Correspondence to: Frank de Wolf

HIV Monitoring Foundation, Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands

f.dewolf@amc.uva.nl