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Original article

Comparison of HIV-infected patients' characteristics, healthcare resources use and cost between native and migrant patients

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Abstract

Objectives: To assess whether patients' characteristics and healthcare resources consumption and costs were different between native and migrant populations in Switzerland.

Methods: All adult patients followed-up in the Swiss HIV-cohort study in our institution during 2000–2003 were considered. Patients' characteristics were retrieved from the cohort database. Hospital and outpatient resource use were extracted from individual charts and valued with 2002 tariffs.

Results: The 66 migrants were younger (29 ± 8 years versus 37 ± 11, p < 0.001), less often of male gender (38 % versus 70 %, p < 0.001), predominantly infected via heterosexual contact (87 % versus 52 %, p < 0.01), with lower mean CD4 level at enrolment (326 ± 235 versus 437 ± 305, p = 0.002) than their 200 native counterparts.

Migrants had fewer hospitalizations, more frequent outpatient visits, laboratory tests, and lower total cost of care per year of follow-up (€ 2'215 ± 4'206 versus 4'155 ± 12'304, p = 0.037). Resource use and costs were significantly higher in people with < 200 CD4 cell counts in both groups.

Conclusions: Migrant population had more advanced disease, more outpatient visits but less hospitalizations, resulting in lower costs of care when compared with native population.

Keywords: Migration – HIV infection – Patient characteristics – Resource use – Costs.

The AIDS pandemic imposes considerable but uneven burden on all healthcare systems in the world. In developed countries, such as the United States of America, total costs of AIDS treatment amount to less than 1 % of direct personal healthcare expenses in the country, despite the widespread use of expensive anti-retroviral therapy (ART).[1] As ART has been shown to substantially decrease mortality by delaying or even averting development of full blown AIDS,[2] the issue at stake is more one of financing this treatment than one of costs of care. On the other hand, in developing countries, limited healthcare budgets cannot afford the provision of these expensive drugs. As a consequence, disease progression more closely follows the natural history of the disease, and mortality is high.[3,4,5]

In countries with immigration from countries with high incidence and prevalence rates of AIDS, two populations coexist: the native population, with early detection of seropositivity and timely initiation of ART, and the migrant population, with late detection of the disease, and sometimes late initiation of antiretroviral triple therapy.

In Switzerland, HIV infected persons followed in one of seven study centers are continuously enrolled in the Swiss HIV cohort study since 1988. This cohort showed an increasing proportion of migrants from Sub-Saharian Africa, ranging from 0.9 % before 1989 to 11.9 % in the 1997–2001 period. These patients were younger, had a lower median CD4 cell count at enrolment, were predominantly female and have been infected by heterosexual intercourse. Altogether, these patients accounted for 22.5 % of newly detected HIV infections in 2000 in Switzerland, representing only 0.3–0.4 % of the Swiss population. The Swiss HIV cohort study showed that there was no difference in adherence to ART, progression to AIDS or survival up to 48 months after starting treatment.[6] However, a direct comparison between patients' characteristics and healthcare resource use and costs in migrant and native populations has never been studied. We therefore used

the data from the patients recruited in our center to answer this question and discuss potential clinical and public health implications.

Methods

Data from the patients included in the Swiss HIV cohort study in our institution during the year 2000–2003 and followed-up at our institution were extracted from the central database. This database records, among other variables, age, gender, origin, route of infection, and CD4 cell count at enrolment. These patients are assessed twice a year with standard laboratory tests, and general information on their treatment, the need for hospitalization for any reason, including pregnancy, is recorded.

Patients were selected if their origin was coded as European (native group), or Sub-Saharian country (migrant group). A few patients from other parts of the world were excluded. Hospital resource use, such as length of stay, number and type of diagnostic and therapeutic procedures, was extracted from the hospital information system, and outpatient resource use, such as number of visits and number and type of diagnostic and therapeutic procedures, was extracted from the individual charts of the outpatient clinics.

Hospital costs were computed from the analytic accounting system of the hospital, and outpatient visits, laboratory test and diagnostic and therapeutic procedures from official tariffs for the year 2002. Cost figures were converted from Swiss francs (CHF) to Euros (€) at the 2002 exchange rate of 1 CHF = 0.67 €.

Data were further stratified by CD4 cell counts (<200, 200–500, >500). Finally, the whole analysis was repeated for the patients infected by heterosexual contact. Comparison of resource use and cost was again carried out between the 2 groups of patients.

As this study only observed current practice and did not involve patients directly, no ethics committee approval nor patient consent was needed

Comparisons of discrete data were carried out with the Student t-test, for normally distributed variables, and with Mann-Whitney U-test otherwise. Comparisons of proportions were carried out with Chi-square tests. The impact of CD4 cell counts on both resource consumption and cost was assessed by one-way analysis of variance (ANOVA). Statistical significance was assumed for p value <0.05.

Results

The native population was made of 200 people, predominantly male (70%), who had acquired their infection mainly by heterosexual contact (42%), by having sex with men (MSM) (26%) and by intra-venous drug use (IVDU) (28%). The majority of them came from Switzerland, France or Germany (174 of them, 87%), while the others came from Italy, Spain or Portugal. On the other hand, the migrant population was made of 66 people of Sub-Saharian origin, predominantly female (62%), infected by heterosexual contact (87%). They were statistically younger (29 ± 8 versus 37 ± 11 years) and had lower CD4 cell counts at enrolment (326 ± 235 versus 439 ± 305), and a higher percentage of them had CD4 cell counts <200 (35% versus 26%). Detailed patients' characteristics are displayed in Table 1.

Detailed per patient average resource consumption is displayed in Table 2. The native group tended to be hospitalized

Table 1. Distribution of patients' characteristics in the native and migrant groups treated at Lausanne University Hospital (CHUV) between 2000 and 2003.

Characteristics	Natives (n = 200)		Migrants (n = 66)		p value
Mean age (SD)	37	(11)	29	(8)	<0.001
Male gender (%)	140	(70)	25	(38)	<0.001
Infection route (%)					<0.001
heterosexual	84	(42)	57	(87)	
homosexual	52	(26)	0	()	
drug addiction	56	(28)	1	(2)	
other	8	(4)	8	(12)	
CD4 blood level					
Mean CD4 level at enrolment (SD)	439	(305)	326	(235)	0.002
>500 (%)	79	(40)	12	(18)	0.007
200–500 (%)	69	(34)	31	(47)	
<200 (%)	52	(26)	23	(35)	

Table 2. Distribution of per patient average health care resource use in the native and migrant groups treated at Lausanne University Hospital (CHUV) between 2000 and 2003, over the whole observation period and by year of follow-up.

Resource use	Natives (n = 200)		Migrants (n = 66)		p value
	Mean	(SD)	Mean	(SD)	
Length of follow-up (years)	2.4	(0.7)	2.2	(0.8)	0.223
Hospitalisations					
Number of stays	2.5	(3.0)	1.5	(0.6)	0.698
Episode length of stay (days)	4.2	(12.4)	3.5	(8.7)	0.775
Total length of stay (days)	7.7	(22.8)	3.5	(7.7)	0.201
Outpatient care					
Visits	9.2	(7.6)	11.5	(7.0)	0.009
Laboratory tests	26.1	(20.6)	30.5	(19.5)	0.086
Imaging	0.6	(1.2)	0.5	(1.2)	0.546
Functional tests	0.1	(0.5)	0.1	(0.6)	0.266
Outpatient care/year of follow-up					
Visits	3.9	(3.3)	5.2	(2.9)	<0.001
Laboratory tests	10.7	(8.8)	13.8	(0.2)	0.008
Imaging	0.2	(0.6)	0.2	(0.5)	0.744
Functional tests	0.1	(0.3)	0.1	(0.4)	0.260

Table 3. Distribution of per patient average health care costs in the native and migrant groups treated at Lausanne University Hospital (CHUV) between 2000 and 2003, over the whole observation period and by year of follow-up.

Cost (Euros)	Natives (n = 200)		Migrants (n = 66)		p value
	Mean	(SD)	Mean	(SD)	
Length of follow-up (years)	2.4	(0.7)	2.2	(0.8)	0.223
Hospitalisations					
Hospital cost	5'986	(18'352)	2'746	(6'583)	0.854
Outpatient care					
Visits	399	(329)	500	(303)	0.009
Laboratory tests	759	(591)	907	(637)	0.108
Imaging	149	(459)	108	(412)	0.523
Functional tests	29	(100)	21	(107)	0.194
Total outpatient care	1'336	(1'108)	1'535	(1'063)	0.114
Total cost of care	7'323	(18'543)	4'281	(6'745)	0.200
Cost/year of follow-up					
Hospitalisations					
Hospital cost	3'595	(12'219)	1'533	(4'044)	0.789
Outpatient care					
Visits	170	(144)	225	(127)	<0.001
Laboratory tests	318	(249)	408	(303)	0.022
Imaging	58	(176)	42	(139)	0.664
Functional tests	14	(52)	13	(85)	0.181
Total outpatient care	560	(458)	688	(437)	0.009
Total cost of care	4'154	(12'304)	2'221	(4'206)	0.037

more often, while the migrant group had significantly more outpatient visits and laboratory tests per year. Respective per patient average costs of care are displayed in Table 3. Mean hospital cost was higher in the native population, but was highly variable between the different individuals, especially among IVDU patients, so that the difference between the two groups did not reach statistical significance. On the other hand, migrants' mean cost of outpatient care was statistically

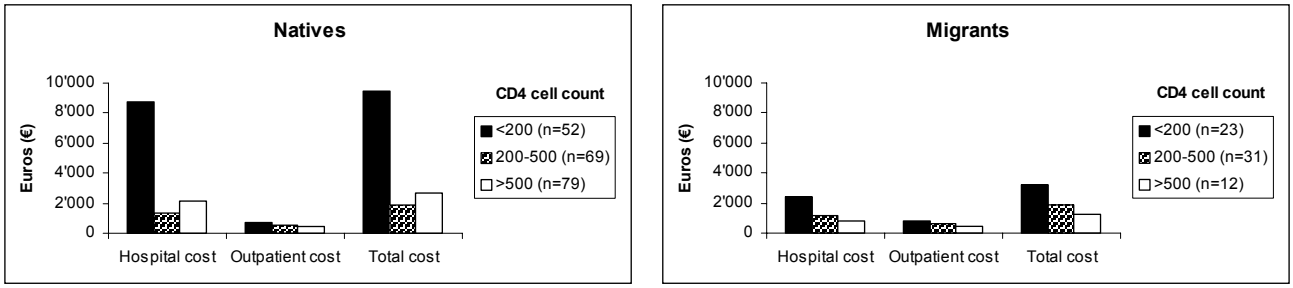

Figure 1. Average yearly cost of hospitalization, outpatient visits, and total costs of care for natives and migrants HIV- infected patients treated at Lausanne University Hospital (CHUV) between 2000 and 2003, by CD4 cell counts.

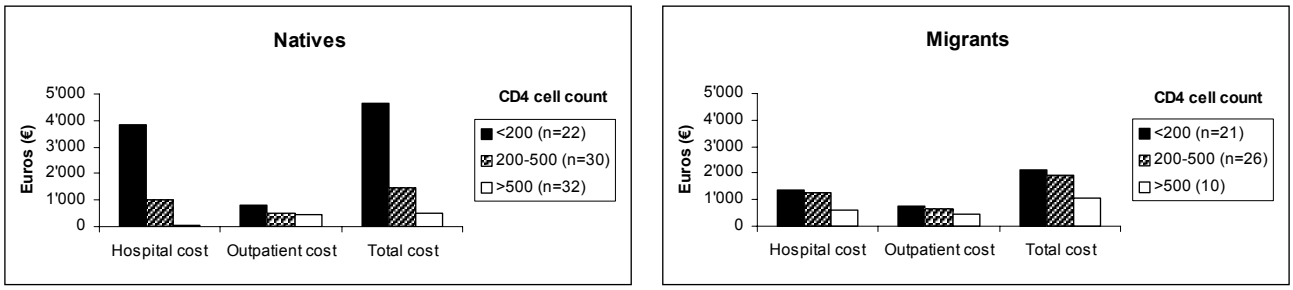

Figure 2. Average yearly cost of hospitalization, outpatient visits, and total costs of care for natives and migrants heterosexually HIV- infected patients treated at Lausanne University Hospital (CHUV) between 2000 and 2003, by CD4 cell counts.

significantly higher for visits and laboratory tests and total outpatient care, particularly when computed as per patient average costs per year. Altogether, total cost of care was statistically significantly higher in the native patient population, due to the higher weight of hospital costs as compared with outpatient costs.

Both resource use and costs of care were significantly higher for the group with the lowest CD4 cell counts in both native and migrant populations (Figure 1). However, the only statistically significant difference in direct comparison between the native and migrant group was observed in per patient average costs per year for outpatient care in the CD4 cell counts range of 200–500 ($p = 0.045$).

When analysis was repeated with only the populations infected by heterosexual contact, patients characteristics such as age, gender, origin, route of infection, and CD4 cell count at enrolment remained similar to those of the initial population in each group. Hospitalization rates were now similar between the 2 groups, for the number of stays (native population 1.7 ± 2.0 vs migrants 1.6 ± 0.7, $p = 0.169$), mean length of stay (natives 4.1 ± 14.7 days vs migrants 3.9 ± 9.3 days, $p = 0.726$), and total length of stay (natives 3.1 ± 10.1 days vs migrants 3.1 ± 6.4 days, $p = 0.108$). Migrants had always statistically significantly more outpatient visits per year of follow-up (natives 4.1 ± 3.7 vs migrants 5.2 ± 3.0, $p = 0.009$), and a trend for more laboratory tests than the native population (natives 10.9 ± 8.3 vs migrants 13.3 ± 8.0, $p = 0.061$). Again, resource use and cost of care were statistically significantly higher in patients with CD4 cell counts <200, in both populations (Figure 2). Only one statistically significant difference in direct comparison between the native and migrant groups was observed in per patient average costs per year for hospital care in the CD4 cell counts range of >500 ($p = 0.014$).

Discussion

This study underscores the fact that migrants from Sub-Saharian Africa in the Swiss HIV cohort study at our institution are identified and enter medical care at more advanced degrees of immunosuppression. While they use more health care resources and have significantly higher outpatient care costs than their counterpart, they generate smaller hospital costs. This difference has to be ascribed to longer hospital stays in native IVDUs patients. However, the main trigger to increasing resource consumption and cost in both groups was low CD4 cell counts. As health care resource use is highly variable between patients over a long term basis, and as our patients had different length of follow-up, costs were expressed as per patient average costs by year, thus better exhibiting the differences between the 2 groups.

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Several studies have assessed the healthcare resource use and cost of AIDS in different countries, using different methods. In America, HIV-infected patients accounted for 1.4 visits per person per month, while 30 % had at least one visit to the emergency department and 20 % were hospitalized for 10.4 days over a period of 6 months; 79 % were treated with ART.[1] In Canada, a cohort of patients followed between 1995–2001 showed an increase in antiretroviral therapy from 30 to 69 %, while in-patient care decreased from 26 % to 10 %, outpatient care from 27 % to 14 %, and home care from 8 % to 3 %, indicating a shift in treatment efficacy.[7]

In Europe, a study carried out in 10 centers in England in 1996 showed that patients were hospitalized an average of 20 days per year, while the number of outpatient visits and cost increased from asymptomatic to symptomatic AIDS (from £ 4'695 to £ 20'358 per year).[8] Similar results were found in Belgium on the basis of a diary held by 41 patients[9] and in Italy in a multicentric prospective cohort of 483 patients followed from 1997 to 1998.[10] The most impressive comparison of two cohorts observed over 6 months in 1994 and 1998 in a multicentric prospective study showed a dramatic decrease in mortality from 33.8 % to 3.9 %, in hospital admissions from 1.7 % to 0.8 %, in length of stay from 28.1 days to 12.6 days, matched by a decrease in direct costs from € 15'390 to € 11'465. In addition, HIV-infected patients treated with antiretroviral regimens had a better health-related quality of life and were dependent to a smaller extent (6.8 % versus 1.4 %). Distribution of the type of costs showed that drug acquisition costs had dramatically increased from 12.8 % to 63.5 % while hospital cost decreased from 45.3 % to 26.1 %, outpatient care from 33.2 % to 10.4 %, and home care disappeared.[2] All these data confirmed that introduction of antiretroviral therapy was effective, even if it markedly increased cost of treatment.

Curiously, no study focused on migrant populations, except in the Swiss HIV cohort study,[6] which showed an increasing proportion of migrants from Sub-Saharian countries, which were younger, more often female, and infected by heterosexual intercourse, had low CD4 cell counts at inclusion, but equal access to ART, and similar prognosis, as HIV positive people from North Western Europe.

Extrapolating data from other studies, which showed an adverse correlation between CD4 cell counts and health resource utilization and cost, it would be tempting to assume that systematic screening might identify HIV positive patients earlier and hence give them access to effective therapy in a more timely way. However, past modelisation of the cost of pediatric infection and AIDS showed that it will be increased if mothers were systematically screened while at the same time increasing the life expectancy and the AIDS-free life expectancy of children.[11] Similarly, another study claimed that cost savings due to highly effective treatment would be illusory if this treatment could not prevent or substantially delay the progression to full-blown AIDS.[12] This perspective has been achieved, as a recent study showed that median survival can now be expected to be more than 35 years for a young person diagnosed with HIV infection.[13] All cost-effectiveness or cost-utility studies have concluded that the cost-effectiveness or cost-utility ratios amounted to about US$ 10–55'000 per life year or quality-adjusted life-year gained in patients from developed countries.[12] This is likely to be the case in migrants as well.[14] All these results prompted the Center for Disease Control to revise its recommendations for HIV testing of adults, adolescents, and pregnant women in health care settings, and advocate wide and repeated screening.[15]

Our study has several limitations. It was carried out in only one center, and hence on a limited number of patients. It did not include health care resource use and costs incurred by patients visiting other physicians than our institution. As the native population is more likely to have used this kind of care than migrants, this factor might explain part of the observed difference in the number of outpatient visits, laboratory tests, and hence costs between the 2 groups. In addition, our study did not focus on drug acquisition costs which were shown to amount to a substantial share in other studies. However, as patients in the Swiss HIV cohort study had no difference in access to this therapy,[6] it is unlikely that this omission might markedly distort the results. Finally, it focuses only on direct medical cost from a payer's perspective.

However, even if the ability to generalize the findings of this study is limited, it provides a first look for Switzerland into this highly controversial and politically sensitive subject. The issues linked with equity of access to voluntary confidential testing for early HIV diagnosis and type of health care provided should be further studied. Although screening was recently publicly discussed in the United States, underlying the potential conflict existing between public health and civil liberties,[16,17] this debate still has to take place in other countries.

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Résumé

Objectifs: Évaluer si les caractéristiques des patients et leur consommation de ressources et coût diffèrent entre population locale et migrante en Suisse.
Méthodes: Les patients adultes de la cohorte HIV Suisse suivis dans notre institution. Leurs caractéristiques ont été extraites des données de la cohorte, leur utilisation de ressources hospitalières et ambulatoires de leurs dossiers et valorisées aux tarifs 2002.
Résultats: Les 66 migrants étaient plus jeunes (29 ± 8 ans versus 37 ± 11, p < 0.001), moins souvent mâles (38 % versus 70 %, p < 0.001), surtout infectés par contact hétérosexuel (87 % versus 52 %, p < 0.01), avec des comptes CD4 plus bas à l'inclusion (326 ± 235 versus 437 ± 305, p = 0.002) que les 200 locaux.
Les migrants avaient moins d'hospitalisations, plus de visites ambulatoires, examens de laboratoire et des coûts annuels de suivi plus bas (€ 2'215 ± 4'206 versus 4'155 ± 12'304, p = 0.037). L'utilisation de ressources et les coûts étaient significativement plus élevés chez les patients avec un compte CD4 < 200 dans les 2 groupes.
Conclusions: Les migrants présentent une maladie plus avancée, plus de visites ambulatoires, mais moins d'hospitalisations, menant à des coûts de prise en charge inférieurs à ceux de la population locale.

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