Employment loss following HIV infection in the era of highly active antiretroviral therapies

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Background: Employment is a major factor in maintaining living conditions of patients with chronic diseases. This study aimed to quantify the frequency and to identify the determinants of employment loss during the first years of HIV disease in the era of highly active antiretroviral therapies (HAART). Methods: The French PRIMO multicentre prospective cohort of 319 patients enrolled during primary HIV-1 infection between 1996 and 2002. Employment loss was defined as moving from employment to inactivity between two visits. Characteristics associated with employment loss were assessed using generalized estimating equations. Results: During a median follow-up time of 2.5 years, 56 employment losses occurred among 51 patients (18.0%). In multivariate analysis, female gender (adjusted odds ratio 3.1; 95% confidence interval 1.1–8.5), non-permanent job (3.8; 1.5–9.3) and poor accommodation (4.2; 1.6–11.2) constituted independent risk factors for employment loss; subjects with a high occupational position had a decreased risk of job loss. Moreover, an updated HIV viral load above 10 000 copies/ml either persistent (2.4; 1.1–5.0) or incident (3.7; 1.0–13.9) and hospitalization in the preceding 6 months (3.9; 1.6–9.7) constituted independent risk factors for employment loss, as tended to be a baseline CD4 cell count < 250/mm³ (1.9; 0.9–4.3) and chronic comorbidity (1.8; 0.9–3.6). Conclusions: In the HAART era, employment loss is frequent from the first months of HIV infection. Employment loss occurs especially in women and in patients with adverse socioeconomic conditions, severe HIV infection and/or comorbidity. Social interventions should seek to prevent HIV-infected patients from leaving their job from the earliest times of the disease.

Keywords: employment, HIV infection, prospective study, socioeconomic factors

Employment is a major factor in maintaining income levels and living conditions among patients with long-lasting chronic diseases.1 Moreover, employment loss has been shown to be independently associated with increased rates of mortality.2 Several studies have shown the adverse effect of chronic illness on employment rates, especially among the lowest social classes.3–6 In Western countries, before 1996 and the wide-scale diffusion of highly active antiretroviral therapies, known as HAART, HIV infection was associated with high rates of employment loss.7–9 Occupational status was associated with the duration and severity of HIV infection: the sickest patients were the least likely to still be working. Moreover, at a comparable disease stage, the patients with the highest risk of losing their job were those with physically demanding work, those who had low control over the pace and scheduling of their work activities, and those belonging to ethnic minorities.10 Since 1996, major changes in the HIV epidemic have occurred in the West, including a shift of the epidemic towards more socially vulnerable populations and major changes in the disease process: HIV infection has become a chronic disease. In this new context, studies in Western countries have reported persistent high unemployment rates among persons living with HIV/AIDS, ranging from 45 to 65%.7–9,11–16 It is not known whether such unemployment rates reflect adverse social conditions that were pre-existent to HIV infection, a persistent proper effect of HIV disease on employment loss despite HAART or both.

In France, the estimated number of persons living with HIV/AIDS in 2003 is ~100 000, among whom 71% are males, mainly infected through homosexual contacts. Non-French natives account for 22% of this population, of whom 55%, in majority women, come from a country of sub-Saharan Africa.17 This study aimed to quantify the frequency and to identify the determinants of employment loss during the first years following HIV infection among a population of patients infected in the HAART era in France.

Methods

Study design

The French ANRS EP8 PRIMO cohort is an ongoing prospective study conducted since November 1996 in 66 hospitals located all over the French territory. The study sample and procedures have been described elsewhere.18 In the participating hospitals, patients are eligible for enrolment if (i) they present during or soon after HIV-1 primary infection—either symptomatic or not, (ii) they are antiretroviral-naïve and (iii) they give their written informed consent to participate. The study has been approved by the local Comité Consultatif de Protection des Personnes se prêtant à la Recherche Biomédicale (Paris, France). After enrolment, participants are followed semi-annually through hospital outpatient visits.

Data collection

At enrolment and at each scheduled visit, data are collected through a physician-administered standard questionnaire and patients are asked to answer a self-administered questionnaire focusing on sexual relations during the last 6-month period. At baseline, information is collected on socio-demographic
characteristics (region of residence; gender; country of birth; age; educational level; employment status; stable partnership defined as the presence of a stable sexual partner in the last 6 months; accommodation; and occupational position), characteristics of HIV disease and its management (transmission category; estimated date of infection; CD4 cell count; viral load; antiretroviral prescription), chronic and acute comorbidity, and ongoing injection drug use. At each follow-up visit, updated data are collected on characteristics of the social situation (employment status and stable partnership), on characteristics of HIV disease and its management (clinical stage; CD4 cell count/mm$^3$ categorized for analyses as $\geq 350$, persistent $<350$ (i.e. $<350$ both at the considered visit and at the precedent one) and incident $<350$ (i.e. $<350$ at the considered visit but $\geq 350$ at the precedent one); viral load in copies/ml categorized as $\leq 10,000$, persistent $>10,000$ and incident $>10,000$; and antiretroviral regimen), on comorbidity (acute affections occurred since the last visit), and on occurrence of any inpatient admission during the period since the last cohort visit.

Statistical analysis
Analyses were restricted to the 319 subjects who had attended at least the first semi-annual follow-up visit at the cut-off point of 31 December 2002. For each patient, data were split in as many observations as the number of periods between two consecutive visits. Observations at risk for employment loss were those with employment reported at the observation’s outset visit. Employment loss was defined as moving from employment to inactivity between two semi-annual outpatient visits. Semi-annual rate of employment loss was computed using the number of employment losses during the period, divided by the total number of observations at risk for employment loss during the same period. Comparison of the risk of employment loss across time since enrolment and identification of individuals characteristic associated with the risk of employment loss were performed using univariate and multivariate logistic regressions based on generalized estimating equations (GEE) of Liang and Zeger$^{25}$ comparing observations with employment loss with those with employment continuity. Such a population-averaged approach was used to estimate regression coefficients and to obtain standard errors adjusted for the correlated nature of employment status over time within patients. Factors potentially associated with the risk of employment loss and thus included in the analyses were last available characteristics at enrolment are shown in table 1. Patients were predominantly males (82.1%) and native of France or another European country (89.4%). Median age at enrolment was 33.6 years (range 15.1 to 72.9). The majority (57.4%) had not reached college level education. At enrolment, 60 (18.8%) held a ‘high’ occupational position, 51 (16.0%) an ‘intermediate’ occupational position, 111 (34.8%) a ‘low’ occupational position (75 clerks, 35 manual workers and one farmer), and 97 (30.4%) were either inactive (16 students, eight retired, three home makers and one with disability) or had an unknown occupational position. A large majority (93.7%) were living in their own accommodation at enrolment, while 13 (4.1%) were living at a friend’s. A stable partnership was reported by 196 patients (61.3%). Most subjects had been HIV-infected through homo/bisexual (62.4%) or heterosexual (27.3%) contacts. At enrolment, 13 patients (4.1%) had a severe immunosuppression with a CD4 cell count $<200$ mm$^{-3}$. A prescription of HAART was initiated in 263 patients (82.5%) at enrolment or during follow-up. Fifty-two (16.3%) had at least one chronic disease in addition to HIV infection at enrolment. Active injected drug use was reported by three patients (0.9%).

Employment rate over time
As shown in table 1, 248 patients (77.7%) were employed at enrolment, among which 19 had a non-permanent job. The overall employment rate showed weak variations over time (figure 1), ranging between 70 and 80% during the whole follow-up. This apparent stability hid substantial variations in employment rate dynamic according to baseline employment status (figure 1): among the 248 patients employed at enrolment, 44 (17.7%) lost their job at least once during follow-up and employment rate decreased continuously from the first months of disease to 92.7% [95% confidence interval (CI) 88.8–95.6] after 6 months, 92.2% (87.8–95.4) after 1 year and 75.0% (59.7–86.8) after 5 years. Among the 69 patients who were either unemployed or students at enrolment, employment rate showed a consistent increase up to 35.5% (23.7–48.7) after 1 year of follow-up and 69.2% (38.6–90.9) after 5 years, although 11 (15.9%) lost the job they had acquired during follow-up. Overall, among the 64 patients unemployed at last follow-up visit, 34 (53.1%) had lost their job since enrolment.

Risk of employment loss
When considering the whole follow-up period, 283 patients were in employment at least at one cohort visit, accounting for 1318 observations at risk for employment loss. Employment loss occurred in 56 of the 1318 at risk observations, while in 1254 employment was maintained, in 7 employment was ceased for undergoing training, and in 1 in employment status at the end of the observation period was unknown. The 56 employment losses concerned 51 (18.0%) of the 283 ever-employed patients: 47 subjects lost their job once during follow-up, three subjects twice and one subject three times. Of the 56 employment losses, 26 (46.4%) occurred during the year following infection among 26 patients, 23 (41.1%) occurred between the second and the fourth year of infection among 22 patients, and 7 (12.5%) occurred from the fifth year of infection onwards among seven patients. Figure 2 shows the rate of employment loss.

Results
Sample characteristics
As of 31 December 2002, the 319 enrolled patients had been followed over a median of 2.5 years (range 5.4 months to 6.6 years) and had attended a median of five semi-annual scheduled outpatient visits after enrolment, representing a total of 1719 observations between two semi-annual visits. At the cut-off point time, 282 patients had attended the month 12 (M12) visit, 199 the M24 visit, 140 the M36 visit, 86 the M48 visit, 57 the M60 visit and 14 the M72 visit. Thirty-six patients (11.3%) had attended their last cohort visit before 1 January 2002 and were thus considered as lost to follow-up. Major patients’ socio-demographic, clinical and biological characteristics at enrolment are shown in table 1. Patients were predominantly males (82.1%) and native of France or another European country (89.4%). Median age at enrolment was 33.6 years (range 15.1 to 72.9). The majority (57.4%) had not reached college level education. At enrolment, 60 (18.8%) held a ‘high’ occupational position, 51 (16.0%) an ‘intermediate’ occupational position, 111 (34.8%) a ‘low’ occupational position (75 clerks, 35 manual workers and one farmer), and 97 (30.4%) were either inactive (16 students, eight retired, three home makers and one with disability) or had an unknown occupational position. A large majority (93.7%) were living in their own accommodation at enrolment, while 13 (4.1%) were living at a friend’s. A stable partnership was reported by 196 patients (61.3%). Most subjects had been HIV-infected through homo/bisexual (62.4%) or heterosexual (27.3%) contacts. At enrolment, 13 patients (4.1%) had a severe immunosuppression with a CD4 cell count $<200$ mm$^{-3}$. A prescription of HAART was initiated in 263 patients (82.5%) at enrolment or during follow-up. Fifty-two (16.3%) had at least one chronic disease in addition to HIV infection at enrolment. Active injected drug use was reported by three patients (0.9%).
Table 1 Major sociodemographic, clinical and biological characteristics at enrolment of the 319 patients of the PRIMO cohort

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>262</td>
<td>82.1</td>
</tr>
<tr>
<td>Female</td>
<td>57</td>
<td>17.9</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>107</td>
<td>33.5</td>
</tr>
<tr>
<td>30–39</td>
<td>119</td>
<td>37.3</td>
</tr>
<tr>
<td>≥40</td>
<td>93</td>
<td>28.2</td>
</tr>
<tr>
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</tr>
<tr>
<td>Primary or high school</td>
<td>183</td>
<td>57.4</td>
</tr>
<tr>
<td>College/postgraduate</td>
<td>127</td>
<td>39.8</td>
</tr>
<tr>
<td>Unknown</td>
<td>9</td>
<td>2.8</td>
</tr>
<tr>
<td>Occupational position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High (managers, executive, craftsmen)</td>
<td>60</td>
<td>18.8</td>
</tr>
<tr>
<td>Intermediate (associate professionals or technicians)</td>
<td>51</td>
<td>16.0</td>
</tr>
<tr>
<td>Low (clerks, manual workers, farmers)</td>
<td>111</td>
<td>34.8</td>
</tr>
<tr>
<td>Inactivity/unknown</td>
<td>97</td>
<td>30.4</td>
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<tr>
<td>Employment status</td>
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<tr>
<td>Working in temporary employment</td>
<td>19</td>
<td>6.0</td>
</tr>
<tr>
<td>Working in stable employment</td>
<td>229</td>
<td>71.8</td>
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<tr>
<td>Unemployed</td>
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<td>15.7</td>
</tr>
<tr>
<td>Student</td>
<td>19</td>
<td>6.0</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>0.6</td>
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<tr>
<td>Accommodation</td>
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<tr>
<td>Personal</td>
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<td>93.7</td>
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<tr>
<td>Unknown</td>
<td>13</td>
<td>4.1</td>
</tr>
<tr>
<td>HIV transmission category</td>
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<td></td>
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<tr>
<td>Heterosexual</td>
<td>87</td>
<td>27.3</td>
</tr>
<tr>
<td>Homosexual</td>
<td>199</td>
<td>62.4</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>1.6</td>
</tr>
<tr>
<td>Unknown</td>
<td>28</td>
<td>8.8</td>
</tr>
<tr>
<td>CD4 cell count/mm(^3)</td>
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<td></td>
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<tr>
<td>≥350</td>
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<td>80.6</td>
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<td>&lt;350</td>
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</tr>
<tr>
<td>≤10,000</td>
<td>60</td>
<td>18.8</td>
</tr>
<tr>
<td>&gt;10,000</td>
<td>259</td>
<td>81.2</td>
</tr>
<tr>
<td>Chronic comorbidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>267</td>
<td>83.7</td>
</tr>
<tr>
<td>Yes</td>
<td>52</td>
<td>16.3</td>
</tr>
</tbody>
</table>

Factors associated with the risk of employment loss

Results of the univariate and multivariate analyses based on GEE comparing the 56 observations with employment loss with the 1254 with continuous employment are presented in table 2. The risk of employment loss was associated with patients’ socioeconomic situation: female gender (aOR 3.1; 95% CI 1.1–8.5), non-permanent job (3.8; 1–9.3) and poor accommodation (4.2; 1.6–11.2) constituted independent risk factors for employment loss; subjects with a ‘high’ occupational position had a significantly decreased risk of job loss. Moreover, regardless of patients’ socioeconomic characteristics, the risk of employment loss was increased among patients with poor health status: advanced HIV disease, characterized by an updated HIV viral load >10,000 copies/ml either persistent (2.4; 1–5.0) or incident (3.7; 1–13.9), and hospitalization in the preceding 6 months (3.9; 1.6–9.7) constituted independent risk factors of employment loss; a baseline CD4 cell count <350/mm\(^3\) (1.9; 0.9–4.3) and chronic comorbidity (1.8; 0.9–3.6) also tended to be associated with an increased risk of employment loss. The other variables included in the multivariate model were not statistically associated with the risk of employment loss.

The associations between the different potential risk factors and the risk of employment loss were homogenous across time since enrolment and calendar period. The associations reported above between health status indicators and risk of employment loss were also found across different subsamples based on sex, education or employment status.

Discussion

Our results show that employment loss is frequent during the first years following HIV infection in the context of our cohort of patients HIV-infected and followed in the HAART era. Half (53.1%) of the patients unemployed at last follow-up visit had lost their job following HIV infection, suggesting that unemployment rates observed among HIV-infected populations reflect not only socioeconomic characteristics pre-existent to HIV infection, but also the consequence of health status alteration on employment status. This hypothesis is strengthened by our finding showing that regardless of patients’ socioeconomic conditions, the risk of employment loss is associated with health status: a baseline low CD4 cell count and/or a persistent elevated viral load, indicating a severe HIV infection, an incident elevated viral load, indicating a deterioration in HIV infection, the occurrence of a hospitalization, indicating a deterioration in global health status, and the presence of another chronic disease in addition to HIV infection constitute independent risk factors of employment loss during the course of HIV disease.

To our knowledge, this is the first prospective study focusing on the evolution of employment status after HIV infection in the HAART era. The few published studies on the topic were conducted before the advent of HAART and/or among patients with advanced HIV disease. Of particular interest in our study is that all patients were enrolled during the HAART era at the early time of primary infection and prospectively followed afterwards,
allowing for the documentation of events occurring during the whole course of the disease, including very early after infection.

The design of the PRIMO study has probably implied a selection of the most socially privileged patients in the study sample: to be enrolled in the cohort, patients had to be diagnosed as HIV-infected at the early stage of primary infection and to become involved in a long-term prospective follow-up, conditions that are likely to exclude the most socially fragile patients. In fact, women and non-French natives were under-represented in our sample compared with the whole population of persons living with HIV/AIDS in France.17 Thus, the frequency of employment loss actually encountered in the whole population of persons living with HIV infection in France and socioeconomic differentials in the risk of employment loss are likely to be even greater than reported among our patients. Censorings are unlikely to have biased our estimations of employment loss rate since the characteristics of the 36 patients lost to follow-up were comparable to those of other patients.

Figure 1 Employment rate (solid line) and sample size (dotted line) over follow-up time: overall (top), among patients employed at baseline (bottom left) and among patients unemployed or students at baseline (bottom right)

Figure 2 Frequency of employment loss (and 95% CI) during each 6-month period between two cohort visits (S1 to S12) from enrolment up to 6 years of follow-up among the 283 ever-employed patients of the PRIMO cohort
We have found that among patients in employment, almost one out of five (18.0%) has ever lost his job after a median time of 2.5 years since HIV infection. This rate is lower than the 35–50% reported in the United States and in Australia among HIV-infected patients, but still meaningful. Six months after enrolment, 92.7% of initially employed patients were still working in our study, a rate consistent with the 94% probability of remaining employed within the first 6 months of HAART reported in a representative sample of US HIV-infected patients.24 Our results indicate that employment loss occurs from the early times of the disease, when physical limitations consecutive to HIV infection are likely to be still limited or non-existent. This finding may be a reflection of the ‘biographical disruption’ consecutive to the diagnosis of chronic illness mentioned by sociological works,24 which may itself lead to a period of increased social vulnerability.

Socioeconomic characteristics identified as determinants of employment loss in our study reflect inequalities encountered more largely in the general population. First, female gender by itself constitutes a disadvantage with regard to employment in the French general population.25 Moreover, in our sample women were more frequently non-French natives than men, they had a lower educational level and they were younger, characteristics that constitute additional disadvantages regarding stable employment. Women are also more likely to be in single parent family, leading to difficulties in managing both familial and occupational duties. Such difficulties may be further increased in case of chronic disease such as HIV infection, leading to employment withdrawal. Unfortunately, no information on patients’ dependents was available in the present study. Secondly, the existence of inequalities in the social consequences of chronic illness has been shown in non-HIV-infected populations, with the subjects holding the lowest

Table 2 Factors associated with the risk of employment loss during the 6-month period following each cohort visit; PRIMO cohort (n = 1310 observations)

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. observations with employment loss (total)</th>
<th>Univariate</th>
<th>Multivariate</th>
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<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>760</td>
<td>Ref.</td>
<td>Ref.</td>
</tr>
<tr>
<td>Female</td>
<td>550</td>
<td>4.3*</td>
<td>2.4–7.8</td>
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<tr>
<td></td>
<td></td>
<td>3.1*</td>
<td>1.1–8.5</td>
</tr>
<tr>
<td>Baseline occupational position</td>
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<td></td>
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</tr>
<tr>
<td>High</td>
<td>3 (310)</td>
<td>Ref.</td>
<td>Ref.</td>
</tr>
<tr>
<td>Intermediate</td>
<td>9 (246)</td>
<td>4.1*</td>
<td>1.1–14.8</td>
</tr>
<tr>
<td>Low</td>
<td>3 (44)</td>
<td>6.3*</td>
<td>1.9–20.6</td>
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<tr>
<td>Inactive or unknown</td>
<td>14 (228)</td>
<td>6.8*</td>
<td>2.0–23.7</td>
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<td></td>
<td></td>
<td>5.1*</td>
<td>1.3–21.0</td>
</tr>
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<td>Employment status</td>
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<td>Stable employment</td>
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<td>Ref.</td>
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<tr>
<td>Temporary employment</td>
<td>14 (95)</td>
<td>4.7*</td>
<td>2.4–9.2</td>
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<td></td>
<td></td>
<td>3.8*</td>
<td>1.5–9.3</td>
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<td>Accommodation at friends</td>
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<td>No</td>
<td>51 (1272)</td>
<td>Ref.</td>
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<tr>
<td>Yes</td>
<td>5 (38)</td>
<td>3.5*</td>
<td>1.0–12.1</td>
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<td>1.6–11.2</td>
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<td>≥350</td>
<td>40 (1025)</td>
<td>Ref.</td>
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<td>&lt;350</td>
<td>16 (285)</td>
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<td></td>
<td></td>
<td>1.9**</td>
<td>0.9–4.3</td>
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<td>Updated viral load (copies/mm³)</td>
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<td>&gt;10 000 (persistent)</td>
<td>20 (275)</td>
<td>2.1*</td>
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<td>&gt;10 000 (incident)</td>
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<td>Ref.</td>
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<td>Yes</td>
<td>7 (65)</td>
<td>2.9*</td>
<td>1.3–6.5</td>
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<td></td>
<td></td>
<td>3.9*</td>
<td>1.6–9.7</td>
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<td>Chronic comorbidity at baseline</td>
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<tr>
<td>No</td>
<td>40 (1098)</td>
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<td>Ref.</td>
</tr>
<tr>
<td>Yes</td>
<td>16 (212)</td>
<td>2.2*</td>
<td>1.1–4.5</td>
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<tr>
<td></td>
<td></td>
<td>1.8**</td>
<td>0.9–3.6</td>
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</table>

*P ≤ 0.05; **P = 0.10
OR = odds-ratio; aOR = adjusted odds-ratio; CI = confidence interval; Ref. = reference category
occupational status experiencing the highest rates of employment loss in case of chronic disease.3,4,6,26 Such inequalities may be related to different factors weakening preferentially subjects of the lowest social classes when they have to face chronic disease, including adverse working conditions (e.g., high level of physical demand, low control over work pace and scheduling), work insecurity (non-permanent employment), employers and colleagues negative attitudes, and workplace discrimination. Moreover, in our study poor accommodation may constitute a proxy of adverse social situation (e.g. low income, small social network, low level of social support, discrimination in daily life), itself exposing patients to an increased risk of employment loss. Absence of association between employment loss and country of birth, which is classically closely related to the social situation, is probably explained by the small number of foreign-born patients in our sample.

On the other hand, about one-third of patients unemployed at enrolment obtained a job after HIV diagnosis in our study. Identification of determinants of such access/return to work during the disease appears complementary to the study of employment loss and requires further analyses.

In summary, we have shown that even among the most socially privileged patients, employment loss is frequent from the first months of HIV infection in the era of HAART. Employment loss occurs especially in women, and in patients with adverse socioeconomic conditions, severe HIV infection and/or comorbidity. Periods following a deterioration in HIV disease and/or a hospital admission constitute critical stages of vulnerability to employment loss. Social interventions should seek to prevent HIV-infected patients from leaving their job from the earliest times of the disease. In order to design such interventions, further studies with more detailed data on patients’ living and working conditions (e.g. dependent persons, social network, level of social support, HIV-related discrimination, working conditions and work security) should provide a better understanding of the mechanisms of employment loss during HIV chronic disease.

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Key points

• In the HAART era, it is unclear whether high unemployment rates among persons living with HIV reflect adverse social conditions that were pre-existent to HIV infection, a proper effect of HIV disease on employment loss despite HAART or both.

• Employment loss is frequent from the first months of HIV infection in the era of HAART, even among the most socially privileged patients.

• Employment loss occurs especially in women and in patients with adverse socioeconomic conditions, severe HIV infection and/or comorbidity; periods following a deterioration in HIV disease and/or a hospital admission constitute critical stages of vulnerability to employment loss.

• Social interventions should seek to prevent HIV-infected patients from leaving their job from the earliest times of the disease.

References


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Appendix

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