

HIV-infection among immigrants in French Guiana: high risk during the first years after arrival

Infeção por VIH entre imigrantes na Guiana Francesa: alto risco durante os primeiros anos após a chegada

Mathieu Nacher^{1,2,3}, Aude Lucarelli², Florence Huber^{2,4}, Sébastien Rabier², Maylis Douine¹, Antoine Adenis^{1,2,3}, Nicolas Vignier^{1,2}

¹ Centre Hospitalier de Cayenne, CIC INSERM 1424, 97300, Cayenne, French Guiana.

² Centre Hospitalier de Cayenne, COREVIH Guyane, 97300, Cayenne, French Guiana.

³ Université de Guyane, Département Formation Recherche Santé, 97300, Cayenne, French Guiana.

⁴ Croix Rouge Française, Cegidd, 97300, Cayenne, French Guiana.

Keywords

HIV; immigrants; place of infection; sexual vulnerability; prevention; French Guiana.

Abstract

Introduction: Over 75% of HIV patients in French Guiana are foreigners most of whom are actually infected locally.

Aims: We aimed to estimate the distribution of infections in time after arrival using a retrospective cohort.

Methods: CD4 erosion modelling allowed to estimate the date of infection which was compared to the date of arrival in French Guiana in the subset of foreign patients that were estimated to have acquired HIV locally.

Results: Among patients estimated to have been infected in French Guiana and having arrived after 1999, over half had been infected within 4 years and a quarter of patients had acquired HIV within the 2 first years after arrival (median 3.9 years IQR=2.1-7.8 years).

Conclusions: The added value of the present results is to show the rapid infection dynamics after arrival and emphasize the necessity of increasingly proactive combined prevention in recently arrived immigrants.

Palavras-chave

HIV; imigrantes; local de infecção; vulnerabilidade sexual; prevenção; Guiana Francesa.

Resumo

Introdução: Mais de 75% dos pacientes com VIH na Guiana Francesa são estrangeiros, a maioria dos quais são na realidade infetados localmente.

Objetivos: Estimar a distribuição das infeções no tempo após a chegada, utilizando uma coorte retrospectiva.

Métodos: A modelagem da erosão CD4 permitiu estimar a data da infeção, que foi comparada com a data de chegada à Guiana Francesa do subconjunto de pacientes estrangeiros que foram estimados como tendo adquirido o VIH localmente.

Resultados: Entre os pacientes estimados como tendo sido infetados na Guiana Francesa e tendo chegado após 1999, mais de metade tinha sido infectada em 4 anos e um tinha adquirido VIH nos dois primeiros anos após a chegada (mediana de 3,9 anos IQR=2,1-7,8 anos).

Conclusões: O valor agregado dos resultados atuais é mostrar a rápida dinâmica da infeção após a chegada e enfatizar a necessidade de uma prevenção combinada cada vez mais proativa nos imigrantes recém-chegados.

Introduction

French Guiana is the French overseas territory with the highest HIV/AIDS incidence. HIV prevalence in pregnant women has been over 1% for over 3

decades and AIDS incidence is ten times higher than the national average (21.6 per 100,000 *vs.* 2.1 per 100,000).^{1,2} The epidemic is mostly concentrated in vulnerable groups. In contrast with mainland France, transmission is overwhelmingly heterosexual and

the HIV cohort includes as many men as women. Multiple sexual partnerships and/or concurrent relationships and a lack of consistent condom use are contributing factors. Prostitution, crack cocaine and being a migrant are the main risk factors in French Guiana.² Over 29% of the population in French Guiana and nearly half of adults are of foreign origin³; over 75% of the HIV cohort in French Guiana are foreign nationals, an unusual situation in Latin America. French Guiana has the highest GDP per capita in Latin America which attracts poor immigrants in search of better economic prospects. Migration and poverty increase sexual vulnerability. Indeed, we showed that over a third of surveyed migrants were frequently engaging in risky sex within French Guiana and therefore were at high risk of acquiring HIV. Multiple concurrent sexual partnerships and transactional sex were also much more frequent than in the rest of the population. About 2/3rds of current sex partners had the same origin, but 2/3rds nevertheless reported occasional sex partners from another country. We previously showed, using CD4 erosion modelling to estimate the date of infection, that over half of patients and up to 2/3rds acquired HIV after their arrival in French Guiana.⁴ Using phylogenetic analysis of the pol gene—a completely different and independent method—we found similar estimates for the proportion of immigrants infected within French Guiana.⁵ Furthermore, we estimated that 18% of patients acquiring HIV transmitted it to another person within 6 months and nearly half within 2 years. With such rapid transmission and given our estimations of intervals between infection and diagnosis in different immigrant groups, this suggests that much transmission has already occurred when patients are finally diagnosed.⁶ To further approach the dynamics of the epidemic in this sexually vulnerable population we aimed to estimate the distribution of infections in time since arrival in French Guiana. This knowledge could help advocacy for increased operational resources for primary prevention and sexual health among migrants in French Guiana.

Methods

Study design

Setting and participants. HIV cohort data in French Guiana has been available since 1989. Clinical, biological and epidemiological data was first entered by research technicians in the DMI2 government

software until 2008, then in eNADIS/DATAIDS, and now transferred on the DOMEVIH government software since 2017.

Inclusion criteria. Patients were included if they were of known foreign origin and were followed in Cayenne for whom the year of arrival in French Guiana and for whom the initial CD4 count at the time of diagnosis were available. Patients from Saint Laurent du Maroni—a border town with intense pendular migration where it is therefore complicated to determine if or when persons actually settled on the territory.

Statistical methods

Likely place of infection. The estimation of year of infection for each patient was based on the rate of CD4 decline, which depended on each person's age and ethnicity, the CD4 count at the time of diagnosis and the estimated CD4 count at the time of HIV infection. The CD4 cell count at the time of HIV sero-conversion and the square root of CD4 cell decline were calculated using a method described in the UK that studied CD4 decline in a cohort of HIV-infected persons, using random effect (slope and intercept) multilevel linear regression models. CD4 counts at the time of infection and the slope were calculated as an age and ethnicity dependent variable. Most migrants French Guiana have African American ancestry thus the median CD4 count and interquartile range, and the slope of CD4 (square root) decline used were those calculated for black populations (median 487(IQR = 377±619)), and 0.2±0.02_age, respectively. For northern Brazilians—often of mixed Amerindian ethnicity—median CD4 count and interquartile range and the slope of CD4 (square root) used the parameters for other ethnicities (median 538(IQR = 403±701)), 0.55±0.02_age. The interval between seroconversion and diagnosis was estimated using the formula $[\text{square root}(\text{CD4 at seroconversion}) - \text{square root}(\text{CD4 at HIV diagnosis})] / \text{slope of CD4 decline}$.

Statistical analysis. The statistical analysis used Stata 16.0 (Stata Corp LP, College Station, TX, USA). By confronting the estimated date of infection with the date of arrival a dichotomous variable was generated and coded 1 for those presumed to have acquired HIV in French Guiana and 0 for those presumed to have acquired HIV outside of French Guiana determined. Among patients who were estimated to have acquired HIV in French Guiana, using a

median estimate, we plotted the histogram of intervals between infection and diagnosis and calculated descriptive statistics.

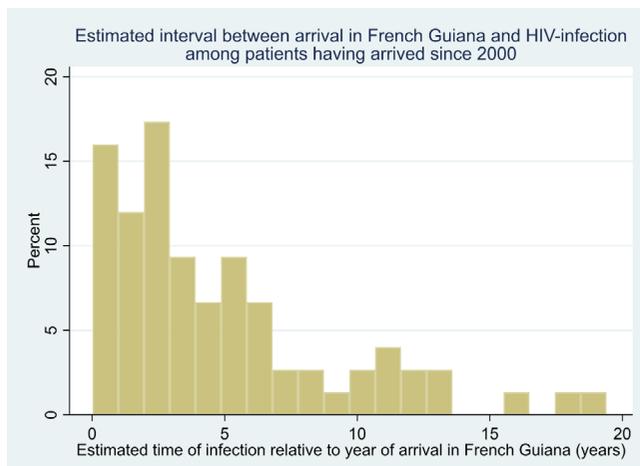
Ethics and funding. Patients included in the FHDH give written informed consent for the use of their case record data for research and publication of research results. Patient identity is encrypted before sending the data to the Institut National de la Recherche Medicale (INSERM), which centralizes data from all over France. The cohort has been approved by the Commission Nationale Informatique et Libertes (CNIL) since Nov 27th 1991 and has led to numerous international scientific publications. No specific funding was obtained.

Results

Overall, 138 foreign patients were estimated to have been infected after arriving in French Guiana; 86 (62.3%) were from Haiti, 19 (13.8%) were from Guyana, 16 (11.6%) were from Brazil, 8 (5.8%) were from Suriname, and the rest from different countries.

More specifically the distribution of infections in time after arrival showed that, for those having arrived after 1999, over half of those estimated to have been infected in French Guiana had been infected within 4 years and that a quarter of patients had acquired HIV within the 2 first years after arrival (median 3.9 IQR=2.1-7.8 years) (Figure 1). For those having arrived before the 2000 the intervals between arrival and HIV were much longer median=10 years (IQR=6.4-17.3 years).

Figure 1 – Distribution of estimated duration between arrival in French Guiana and HIV-infection among immigrants estimated to have acquired HIV in French Guiana using rate of CD4 decline modelling.



Discussion

Here, we show that immigrants are at high risk of getting infected by HIV in the first years after their arrival in French Guiana. This is consistent with previous behavioral studies⁷ and with the fact that, upon arrival, immigrants lack social capital, resources—sometimes resorting to transactional sex—and start a new life—including engaging with new sex partners—circumstances that increase sexual vulnerability.⁸ The apparent start of immigrants' new sexual life in highly risky sexual networks emphasizes that primary prevention through combined methods, including preexposure prophylaxis, and early testing are of paramount importance to impact HIV transmission in French Guiana. The frequency of sexual violence also suggests that information about post exposure prophylaxis should also be emphasized. Specific efforts should be made to engage with immigrants, notably newly arrived ones in order to bypass obstacles linked to fear of arrest or absence of health insurance.

Conclusions

Although previous studies have emphasized the importance of infections after migration, to our knowledge the added value of the present results is to show the dynamics after arrival and emphasize the necessity of increasingly proactive combined prevention in recently arrived immigrants—the most vulnerable ones.

Study design: MN; Investigation: MN, AL, FH, LA, SR, AA, NV; Analysis: MN; Validation: AL, FH, LA, SR, AA, NV; First draft : MN ; Review and Editing: AL, FH, LA, SR, AA, NV ; Final draft: MN. 

Conflicts of interest

The authors declare no conflict of interest

Funding

No specific funding was received for this work.

References

1. Cazein F, Pillonel J, Le Strat Y, Pinget R, Le Vu S, Brunet S, et al. Découvertes de séropositivité VIH et de sida, France, 2003–2013. *Bull Epidemiol Hebd*. 2015;9:152A61.

2. Nacher M, Vantilcke V, Parriault MC, Van Melle A, Hanf M, Labadie G, et al. What is driving the HIV epidemic in French Guiana? *International journal of STD & AIDS*. 2010;21(5):359-61.
3. Dossier complet – Département de la Guyane (973) | Insee [Internet]. [cited 6 Jul 2021]. Available from: <https://www.insee.fr/fr/statistiques/2011101?geo=DEP-973>
4. Nacher M, Adriouch L, Melle AV, Parriault M-C, Adenis A, Couppié P. Country of infection among HIV-infected patients born abroad living in French Guiana. *PLOS ONE*. 8 Feb 2018;13(2):e0192564.
5. Arantes I, Bello G, Darcissac E, Lacoste V, Nacher M. Using phylogenetic surveillance and epidemiological data to understand the HIV-1 transmission dynamics in French Guiana. *AIDS*. 1 May 2021;35(6):979-84.
6. Nacher M, Adenis A, Huber F, Hallet E, Abboud P, Mosnier E, et al. Estimation of the duration between HIV seroconversion and HIV diagnosis in different population groups in French Guiana: Strategic information to reduce the proportion of undiagnosed infections. *PLoS One*. 2018;13(6):e0199267.
7. Eubanks A, Parriault MC, Van Melle A, Basurko C, Adriouch L, Cropet C, et al. Factors associated with sexual risk taking behavior by precarious urban migrants in French Guiana. *BMC Int Health Hum Rights*. 8 Jun 2018;18(1):24.
8. Desgrées-du-Loû A, Pannetier J, Ravalihasy A, Gosselin A, Supervie V, Panjo H, et al. Sub-Saharan African migrants living with HIV acquired after migration, France, ANRS PARCOURS study, 2012 to 2013. *Euro Surveill*. 2015;20(46).