Cost-effectiveness analysis of early access to medical and social care for migrants living with HIV in France

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INTRODUCTION

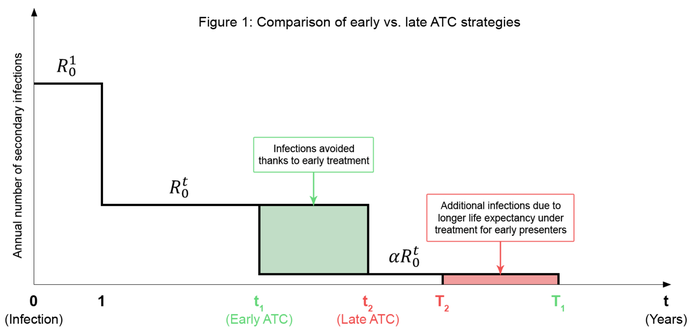
- In 2011, migrants accounted for 47% of newly diagnosed cases of HIV infection in France, including 70% from Sub-Saharan Africa
- These populations meet with specific obstacles leading to late diagnosis and access to medical and social care
- Reducing these delays has a proven benefit to patients' health and contributes to a better control of the epidemic by preventing secondary infections

→ The objective of this study is to assess the **cost-effectiveness of an early access to care** (ATC) for migrant people living with HIV (PLHIV) in France

MATERIALS AND METHODS

- The model compares "early" vs. "late" ATC for migrant PLHIV in France, defined by an entry into care with a CD4 cell count of 350 and 100/mm^3 respectively
- Total costs and secondary infections are compared
- Total costs include lifelong cost of care for patients once they are diagnosed plus costs associated with secondary infections

Figure 1: Comparison of early vs. late ATC strategies



Modeling of intervention:

- Infection occurs in t_0
- Early and late treatment start in t_1 and t_2, end by death in T_1 and T_2 and generate a patient cost of care C_1 and C_2, respectively
- By calculating total costs TC_1 and TC_2, cost of secondary infections is valued at C_1

Estimating R_0^t

R_0^t is the mean annual number of secondary infections caused by an HIV-infected individual who does not benefit from treatment:

$$R_0^t = \frac{New\ transmissions\ in\ the\ migrant\ category\ due\ to\ undiagnosed\ migrants}{Total\ number\ of\ undiagnosed\ migrants}$$

Its value depends on:

(1) The number of undiagnosed migrants (French national survey / INSERM)
(2) The annual number of new infections in the migrant category (Ndawinz et al., 2011)
(3) The share of annual new infections caused by undiagnosed HIV infected migrants (ANRS, VESPA2 and calculation method of Marks et al., 2006)

▶ Four possible values of R_0^t depending on the value of **(1)** and **(2)**

Estimating α

α is the reduction in the annual number of secondary infections for HIV positive migrants who are diagnosed. Its value depends on both:

- The reduction of infectivity under treatment: 90% (conservative assumption based on HPTN 052; Attia et al., 2009; Baggaley et al., 2013)
- The evolution of preventive behavior after diagnosis. Two scenarios: stability vs. 53% reduction in the number of unprotected sex acts

Treatment timing and costs for early and late presenters:

Parameter	Definition	Value	Source
C_1	Cost of care for early treated patients	€686,426	Sloan et al. (2012)
C_2	Cost of care for late treated patients	€513,200	Sloan et al. (2012)
t_1	Start date of treatment for early presenters	4	Lodi et al. (2011)
t_2	Start date of treatment for late presenters	9	Lodi et al. (2011)
$t_2 - t_1$	Treatment delay for late presenters	5	Lodi et al. (2011)
T_1	Death date of early presenters	38	ART Cohort Collaboration (2008)
T_2	Death date of late presenters	32.8	ART Cohort Collaboration (2008)

Four implementation scenarios:

Parameter	Scenario 1	Scenario 2	Scenario 3	Scenario 4
R_0^t	0.0589	0.1199	0.0531	0.098
α	0.1	0.047	0.1	0.047

Secondary infections avoided thanks to the early treatment:

$$R_0^{t_2} - R_0^{t_1} = R_0^t\left[(1-\alpha)(t_2 - t_1) - \alpha(T_1 - T_2)\right]$$

Early treatment strategy is cost-saving if:

$$TC_1 < TC_2$$
$$\Leftrightarrow C_1 + C_1 R_0^{t_1} < C_2 + C_1 R_0^{t_2}$$
$$\Leftrightarrow C_1 - C_1\left(R_0^{t_2} - R_0^{t_1}\right) < C_2$$

RESULTS

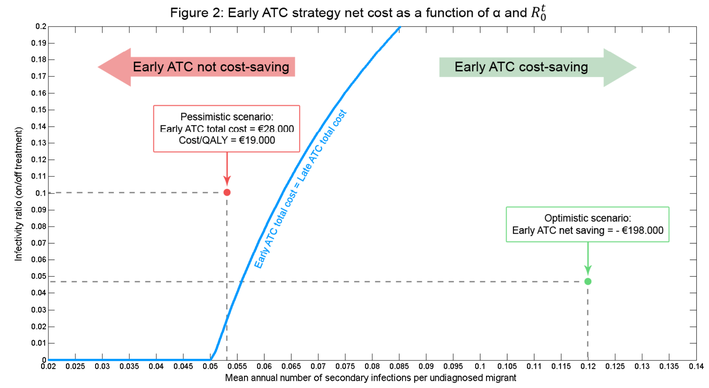
Early ATC strategy proved cost-saving, or cost-effective in the worst case scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Net cost of early ATC (€)	12,313	-198,831	28,158	-130,874
Infections averted	0.2344	0.5420	0.2113	0.4430
Cost by QALY (€)	7508	Cost-saving	19,037	Cost-saving

In the most favorable scenario: early ATC strategy **generated an average net saving of €198,000** (~USD 271,000) per patient, and prevented 0.542 secondary infection

In the worst case scenario: early ATC strategy generated an average cost of €28,000 (~USD 38,000), a **cost-effectiveness ratio of €19,000/QALY** (~USD 26,000/QALY) and **prevented 0.2 secondary infection**

Figure 2: Early ATC strategy net cost as a function of α and R_0^t



Sensitivity analysis

Early ATC remains cost-effective when:

- Late treatment is defined as an entry into care at 200 CD4/mm^3
- Treatment delay for late presenters is reduced to 4 years
- Life expectancy for early presenters increases from 32 to 36 years
- Averted infections are valued at C_2 (€513,200)

Limits

Static nature of the model studied due to lack of data:

- Only takes into account infections averted in the first stage
- In reality: cumulative process of avoided secondary infections

▶ Model underestimates both the number of infections averted and the savings due to earlier treatment of HIV-positive migrants

CONCLUSIONS

- In addition to individual health benefit, improving early ATC for migrant PLHIV proves an **efficient strategy in terms of public health and economics**
- These results stress out the benefit of **ensuring ATC for all individuals living with HIV in France**
- Further research should focus on ways to improve access to care for migrants in France

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