Antiretroviral treatment outcomes among foreign-born and Aboriginal peoples living with HIV/AIDS in northern Alberta

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ABSTRACT

OBJECTIVE: The HIV/AIDS epidemic disproportionately involves socially vulnerable populations. Since 2001, the proportion of foreign-born patients served by the Northern Alberta HIV Program has increased. Our study aimed to evaluate antiretroviral therapy (ART) outcomes among HIV-infected foreign-born patients in northern Alberta, Canada, prescribed once-daily ART.

METHODS: We utilized a two-part retrospective cohort study to compare ART outcomes of foreign-born and Canadian-born Aboriginal patients compared to Canadian-born non-Aboriginal patients. Part 1 utilized logistic regression to compare the odds of experiencing initial virological suppression of foreign-born (40%) and Canadian-born Aboriginal patients (27%) compared with Canadian-born non-Aboriginal patients (33%). Part 2 used survival analysis to compare the rate of ART failure by country of origin among patients who achieved initial virological suppression in Part 1.

RESULTS: Our study sample included 322 treatment-naïve patients (122 foreign-born). For Part 1, 261 patients achieved initial virological suppression within six months of initiating ART. After controlling for age, treatment regimen, HIV risk exposure, and calendar year compared to Canadian-born non-Aboriginal patients, the odds of achieving initial virological suppression were significantly lower for Canadian-born Aboriginal patients (OR=0.44, 95% CI: 0.20-0.96); and similar for foreign-born patients (OR=0.76, 95% CI: 0.33-1.73). Part 2 included 261 patients who were followed for 635.1 person-years. Adjusting for age, sex, baseline CD4 cell count, and drug regimen, compared to Canadian-born non-Aboriginal patients, Canadian-born Aboriginal and foreign-born patients had similar rates of virological failure after achieving initial virological suppression (HR=1.54, 95% CI: 0.38-6.18; HR=0.49, 95% CI: 0.11-2.20, respectively).

CONCLUSIONS: Our study indicated that ART outcomes among Alberta-based foreign-born patients are similar to those among Canadian-born non-Aboriginal patients. Our results, however, suggested that Canadian-born Aboriginal patients had poorer treatment outcomes compared to Canadian-born non-Aboriginal patients. It is imperative, therefore, that clinicians, researchers and community members better understand reasons for poor ART outcomes among Canadian-born Aboriginal patients in northern Alberta.

KEY WORDS: Antiretroviral therapy; emigrants and immigrants; HIV-1; treatment outcomes; Canada

La traduction du résumé se trouve à la fin de l'article.

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The HIV/AIDS epidemic disproportionately impacts vulnerable populations. In 2012, persons born in HIV-endemic countries comprised approximately 2.2% of the Canadian population but accounted for 13% of newly diagnosed HIV cases.¹ In Alberta, from 2000-2005, next to Caucasians, Aboriginal peoples made up the second-largest group of HIV cases with known ethnicity. After 2006, however, there have been more individuals from HIV-endemic countries diagnosed with HIV compared to Aboriginal peoples.² Antiretroviral therapy (ART) has the potential to dramatically increase healthy life expectancy, but requires lifelong treatment and a high level of adherence. Despite the well-documented benefits of ART, vulnerable HIV-infected patients in Canada appear to experience less successful ART outcomes. Recently Martin et al.³ found that after starting ART, Canadian-born Aboriginal (CBA) patients experienced higher rates of treatment failure compared to Canadian-born non-Aboriginal (CBNA) patients. Researchers have also noted that CBA HIV-infected patients experienced higher rates of HIV-related and all-cause mortality compared to CBNA patients.^{3,4}

Little attention has been given to ART outcomes among foreign-born (FB) patients in North America. A better understanding of ART outcomes in the FB population is important as this is a

substantial and growing population.^{1,2} The stress of resettlement after migration and lack of familiarity with the Canadian medical system can impact access to health care, resulting in poorer ART outcomes.⁵ Cultural barriers, including health beliefs and expectations of a medical interaction, may also impact access to health care and ART outcomes. Further, stigma may be a major obstacle to accessing care in close-knit ethnic communities. Findings from the United States indicated that delayed presentation for HIV-related medical care was associated with belonging to an ethnic minority and HIV transmission through heterosexual contact.^{6,7} Foreign-born patients, consequently, may also experience poorer HIV treatment outcomes, including virologic failure and progression of HIV disease.

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To understand how FB and CBA patients served by our clinic were doing on once-daily ART (the standard of HIV care), and to determine whether there were differences in ART outcomes, we compared ART outcomes between HIV-infected patients born in Canada and those born elsewhere using a retrospective cohort. In this paper, therefore, we report the probability of achieving virological success for FB, CBA and CBNA patients prescribed once-daily ART from 2006-2012. Among those patients who achieved virological suppression, we compared the rates of subsequent virological failure.

METHODS

Our study was a two-part retrospective cohort study in which we assessed: Part 1, the odds of achieving initial virological suppression by FB status compared with CBA and with CBNA patients; and Part 2, the rate of ART failure by FB status among patients who achieved initial virological suppression in Part 1. This study was approved by the University of Alberta Health Ethics Research Board.

Study setting and data source

We conducted our research with the clinicians at the Northern Alberta HIV Program (NAP). The NAP, a HIV clinic based in Edmonton, cares for all HIV-infected individuals in the northern half of Alberta (from Red Deer to the Northwest Territories border), comprising approximately 2,000 patients. The population of HIV-infected individuals in northern Alberta is heterogeneous with approximately one third of patients self-identifying as Métis or First Nations and 15-20% of patients having been born outside of Canada.

The NAP team includes infectious disease physicians, nurses, pharmacists, social workers, psychologists and dietitians. Initial genotypic viral resistance testing is performed on each new patient. Patients are usually seen in follow-up approximately four weeks after starting ART, then every three to four months. Antiretroviral therapy in northern Alberta is dispensed from two outpatient pharmacies, and is provided free of charge for all patients with provincial health care coverage; this program also provides CD4 cell counts, HIV-1 viral load (VL) measurements, and routine genotypic sensitivity testing, and any resistance identified is taken into account in the selection of the treatment regimen. Additionally, Canada has a national program which covers ART for refugees who qualify.

Our study's primary data source was the NAP clinic database. This database contains patient-related information, including patient demographics, risk behaviours, ART prescribed, CD4 cell counts, and VL measurements and is updated following each patient's clinic visit.

Study patients

We assembled a cohort of patients from the NAP database using the following inclusion criteria: 1) started ART between 1 January 2006 and 1 January 2012 (baseline); 2) previously ART-naïve; 3) receiving once-daily ART; and 4) ≥ 18 years of age when starting ART. We defined ART as a combination of at least three antiretrovirals, other than ritonavir, recorded as prescribed on the same date. We excluded ritonavir assuming that during the study period (2006-2012), physicians prescribed ritonavir at low

Figure 1. Flow chart of the study population for Part 1 (initial virological suppression) and Part 2 (ART failure)

dosages intended to “boost” other protease inhibitors (PI), rather than at clinically therapeutic levels. The ART start date was the first date that an ART prescription is recorded in the NAP database, and we assumed, unless otherwise stated, that patients remained on ART. We specified January 2006 as the start of follow-up as the standard of HIV care had become once-daily ART in the vast majority of cases by 2006.⁸ As a result, our analysis focused on individuals prescribed once-daily ART.

We excluded patients if they: 1) were missing country of birth data; 2) were missing baseline VL data; 3) had a baseline VL <400 copies/mL; 4) had <6 months follow-up time; or 5) started ART ≤ 26 weeks before delivering a baby. We excluded the latter group of patients in order to limit the study group to patients who started ART for the purpose of treatment rather than to prevent vertical transmission of HIV. We excluded patients with baseline VLs that were missing or <400 copies/mL under the assumption that these patients were not ART-naïve when initiating ART (i.e., these patients may have been transferred from elsewhere on treatment).

Statistical analysis

The exposure variable of interest was FB status; we defined FB patients as those individuals who reported being born outside of Canada. We followed up patients from 1 January 2006 until 1 July 2012, allowing for a follow-up time of six months to six years.

Table 1. Patient characteristics by country of origin for Part 1: Initial virological suppression (n=322; 81% achieved initial viral suppression)

Characteristic	Foreign-born (n=128)	Canadian-born Aboriginal (n=87)	Canadian-born non-Aboriginal (n=107)	Class p-value
Proportion achieving initial VS, n (%)	105 (82)	63 (72)	93 (87)	0.04
Age (years) at baseline, median (IQR)	38 (34.5-44.5)	42 (34-47)	45 (38-51)	<0.001
Age at baseline, n (%)				0.002
17-30	18 (14)	14 (16)	12 (11)	
31-40	58 (45)	25 (29)	23 (22)	
41-50	36 (28)	33 (38)	43 (40)	
51-77	16 (13)	15 (17)	29 (27)	
Sex, n (%)				>0.001
Female	68 (53)	41 (47)	16 (15)	
Male	60 (47)	46 (53)	91 (85)	
HIV exposure category, n (%)				>0.001
Injection drug use	3 (2)	38 (44)	28 (26)	
Other exposure	125 (98)	49 (56)	79 (74)	
CD4 cells/ μ L at baseline, median (IQR)	240 (150-340) (n=122)	225 (90-360) (n=86)	211 (90-360) (n=103)	0.53
CD4 cells/ μ L at baseline, n (%)				0.42
5-50	13 (10)	13 (15)	20 (19)	
51-200	35 (27)	27 (31)	30 (28)	
201-350	46 (36)	24 (28)	27 (25)	
351-1130	28 (22)	22 (25)	26 (24)	
Missing	6 (5)	1 (1)	4 (4)	
HIV RNA copies/mL at baseline, median (IQR)	27,000 (4836.5-135,000)	32,000 (8600-98,000)	73,000 (21,000-190,000)	0.38
HIV RNA copies/mL at baseline, n (%)				0.09
0-9999	40 (31)	26 (30)	18 (17)	
10,000-44,999	33 (26)	23 (26)	25 (23)	
45,000-139,999	23 (18)	20 (23)	33 (31)	
140,000-750,000	32 (25)	18 (21)	31 (29)	
Initial HAART regimen, n (%)				0.03
PI-based	68 (53)	46 (53)	39 (36)	
Not PI-based	60 (47)	40 (47)	68 (64)	
Year starting HAART, n (%)				0.01
2006-2008	68 (54)	30 (34)	42 (40)	
2009-2012	59 (46)	57 (66)	64 (60)	

VS=viral suppression; IQR=interquartile range; PI=protease inhibitor; HAART=highly active antiretroviral therapy.

Initially for Part 1 and Part 2, we tabulated and compared patient characteristics between FB, CBA and CBNA patients with other exposures using χ^2 tests for categorical variables and Kruskal-Wallis rank tests for continuous variables.

For Part 1, we utilized logistic regression to assess the odds of achieving initial virological suppression with respect to FB status, adjusting for potential confounding variables. We defined viral suppression as one VL test <400 copies/mL $\leq$ 6 months after starting ART. We defined patients without VL tests $\leq$ 6 months after starting ART as not achieving initial virological suppression.

For Part 2, we used Cox proportional hazard models to determine the rate of virological failure among those patients who achieved initial virological success in Part 1. We defined virological failure as the first of two consecutive VL tests >400 copies/mL. In unadjusted analysis for Part 2, we utilized cumulative incidence curves, as described by Vittinghoff et al.,⁹ to compare rates of virological failure by FB status. We compared hazard ratios of virological failure using Cox proportional hazards models,⁹ adjusting for potential confounding variables. We assessed the proportional hazards assumption for FB status using a time-varying covariate (FB status by the logarithm of observation time), which we entered into an unadjusted model of virological failure.

We measured observation time for Part 2 in person-years,¹⁰ starting on the date of initial virological suppression and, depending on the patient's outcome, ending on the earliest of the following events: 1) the date of the first (of 2 consecutive) viral loads $\geq$ 400 for patients who experienced virological failure; 2) 1 January 2012 for patients who were censored; or 3) the date of death for those who died.

We considered many potential confounding variables: ART regimen (PI- or non-PI-based), baseline age, baseline CD4 cell count, baseline VL, calendar year, IDU as an HIV exposure category, and sex. We defined patients as IDU if NAP staff recorded their HIV exposure as IDU or any exposure combined with IDU; we considered patients with other exposures, including unknown/missing exposures, as "other exposures". We defined baseline CD4 cell count and VL as the closest tests taken to the ART start date. In our unadjusted analysis, we identified all potential confounding variables as associations with initial virological suppression and subsequent virological failure with two-tailed *p*-values of <0.20. In the final statistical models, *p*-values were two-tailed and associations <0.05 statistically significant. We conducted analyses with Stata (version 11.0; StataCorp LP, College Station, TX).

RESULTS

During the study period, 550 persons were prescribed ART and 322 patients met the eligibility criteria for Part 1 (initial virological suppression). We excluded 228 patients, the majority of whom were missing a baseline VL measurement (53%) or had a baseline VL <400 copies/mL (22%) (Figure 1). Table 1 shows the patient characteristics of the 322 patients in Part 1.

Part 1 – Initial virological suppression

In Part 1, 261 (81%) achieved initial virological suppression within six months of initiating ART (Table 1). Of the 61 patients who did not achieve initial virological suppression, 23 were FB

Table 2. Unadjusted and adjusted logistic regression models assessing initial virological suppression after initiating ART (n=322)

Variable	Unadjusted analysis			Adjusted analysis		
	Unadjusted Odds Ratio	95% CI	p-value	Adjusted Odds Ratio*	95% CI	p-value
Country of origin		Class $p=0.04$				
Canadian-born non-Aboriginal (ref)	1.00	—	—	1.00	—	—
Foreign-born	0.69	0.33-1.41	0.31	0.73	0.33-1.73	0.51
Canadian-born Aboriginal	0.40	0.19-0.82	0.01	0.44	0.20-0.96	0.04
HIV exposure category (Injection drug use vs. other exposures)	0.58	0.31-1.09	0.09	0.58	0.27-1.23	0.15
Sex (Female vs. male)	1.16	0.65-2.06	0.62	—	—	—
CD4 cells/ μ L at baseline		Class $p=0.74$				
5-50 (ref)	1.00	—	—	—	—	—
51-200	0.07	0.45-2.53	0.88	—	—	—
201-350	1.65	0.67-4.05	0.28	—	—	—
351-1130	1.04	0.43-2.54	0.93	—	—	—
Missing baseline CD4 count	1.25	0.21-6.74	0.80	—	—	—
HIV RNA copies/mL at baseline		Class $p=0.76$				
0-9999	1.31	0.61-2.83	0.48	—	—	—
10,000-44,999	1.16	0.54-2.48	0.70	—	—	—
45,000-139,999	1.52	0.68-3.42	0.31	—	—	—
140,000-750,000 (ref)	1.00	—	—	—	—	—
Baseline age, years		Class $p=0.07$				
17-30 (ref)	1.00	—	—	1.00	—	—
31-40	2.37	1.07-5.25	0.03	2.11	0.89-5.00	0.09
41-50	2.70	1.21-6.02	0.02	2.51	1.03-6.07	0.04
51-77	2.93	1.14-7.53	0.03	2.61	0.94-7.27	0.07
Baseline ART regimen (PI vs. non-PI based)	0.64	0.37-1.11	0.12	0.70	0.38-1.27	0.24
Baseline calendar year (2009-2012 vs. 2006-2008)	1.82	1.03-3.23	0.04	2.32	1.25-4.30	0.01

Ref=referent group, PI=protease inhibitor. *Variables with p -values ≤ 0.20 were included in the multivariable model.

and 24 were CBA patients. Four (6.6%) of these 61 patients died ≤ 6 months after starting ART, all of whom were CBA patients. In the unadjusted analysis, there was no significant difference in terms of likelihood of achieving initial virologic suppression between FB and CBNA patients (Table 1, $p=0.31$). Canadian-born Aboriginal patients, however, were significantly less likely than CBNA patients to experience initial virological suppression (Table 1, $p=0.01$). After controlling for the effects of age, ART regimen, IDU as an exposure to HIV, and calendar year, compared to CBNA patients, there was no significant difference for the odds of achieving initial virological suppression for FB patients; however, the odds were significantly lower for CBA patients (Table 2).

Part 2 – HIV treatment failure

The 261 patients who achieved virological suppression were eligible for Part 2.

We followed these patients retrospectively for a total of 635.1 person-years; 21 (8.1%) experienced virological failure, 234 (90%) were censored, and 6 patients died, indicating that no patients left care for reasons other than death. Of the 6 patients who died, 4 (1.5%) died before experiencing any other event and 2 (9.5%) patients who experienced virological failure died. The event rate for experiencing virological failure was 3.3% per year. There was no significant difference between FB and CBNA patients in the rate of virological failure (8% vs. 4%, $p=0.68$), however CBA patients were significantly more likely than CBNA patients to experience virological failure (15% vs. 4%, $p=0.01$). Compared to CBNA patients, CBA patients experienced a significantly higher cumulative incidence of virological failure (Class $p=0.01$) (Figure 2).

In Cox proportional hazards models, there was no statistically significant difference in unadjusted virological failure rates for FB patients compared to CBNA patients (Table 3). Conversely, CBA patients experienced significantly higher unadjusted virological failure rates compared to CBNA patients (Table 3). Adjusting for

age, sex, baseline CD4 cell count, and ART regimen, neither FB nor CBA patients had a statistically significant different rate of virological failure compared to CBNA patients after achieving initial virological suppression Table 3.

DISCUSSION

We observed that among HIV-infected patients starting ART, FB and CBNA patients had similar ART outcomes. Conversely, CBA patients were less likely to achieve initial virological suppression compared to CBNA patients. Finally, among patients who achieved initial virological suppression, rates of virological failure did not differ for FB or CBA patients.

Our findings are in accordance with a Canadian study evaluating the impact of a recent policy change to Canada's Immigrant Act.¹¹ This study compared initial virological suppression among Canadian-born, Sub-Saharan African (SSA)-born, and FB other than SSA patients. The authors defined virological suppression as achieving a VL <40 copies/mL for two consecutive measurements. Although SSAs initially presented into care with a lower CD4 cell count than Canadian-born patients, these authors observed that the responses to ART were similar in SSA and Canadian patients.¹¹ Two studies in Europe compared virological failure rates by FB status and observed results comparable to our study.^{12,13} After adjusting for confounding variables, both studies reported no differences in the time to virological failure among FB and non-FB patients. Similar to our study's analysis, these researchers considered age, sex, ART regimen, baseline CD4 cell count, baseline VL, and risk behaviour for HIV infection as confounding variables. However, residual confounding may be of concern; additional factors that may have an effect on ART outcomes among FB patients include differences in social, cultural and economic conditions.¹⁴

In fact, Gardezi et al.¹⁵ conducted a qualitative study to understand HIV-related treatment concerns. Among HIV-positive Caribbean and East African individuals living in Toronto,

Table 3. Unadjusted and adjusted Cox Proportional Hazard models assessing virological failure after initial virological suppression (n=261)

Variable	Unadjusted analysis			Adjusted analysis		
	Unadjusted Hazard Ratio	95% CI	p-value	Adjusted Hazard Ratio*	95% CI	p-value
Country of origin		Class $p=0.03$				
Canadian-born non-Aboriginal (ref)	1.00	–	–	1.00	–	–
Foreign-born	1.29	0.39-4.30	0.68	0.49	0.11-2.20	0.35
Canadian-born Aboriginal	4.16	1.27-13.58	0.02	1.54	0.38-6.18	0.54
Sex (Female vs. male)	4.97	1.82-13.57	0.002	2.96	0.77-11.40	0.12
HIV exposure category (Injection drug use vs. other exposures)	1.34	0.45-4.02	0.60	–	–	–
CD4 cells/ μ L at baseline		Class $p=0.13$				
5-50 (ref)	1.00	–	–	1.00	–	–
51-200	0.67	0.11-4.04	0.67	0.39	0.06-2.61	0.33
201-350	1.71	0.36-8.06	0.50	0.69	0.11-4.23	0.69
351-1130	2.89	0.61-13.67	0.18	0.49	0.07-3.38	0.47
HIV RNA copies/mL at baseline		Class $p=0.75$				
0-9999	1.51	0.50-4.54	0.46	–	–	–
10,000-44,999	0.87	0.24-3.10	0.83	–	–	–
45,000-139,999	0.84	0.24-3.00	0.70	–	–	–
140,000-750,000 (ref)	1.00	–	–	–	–	–
Baseline age (years)		Class $p<0.001$				
17-30 (ref)	1.00	–	–	1.00	–	–
31-40	0.24	0.09-0.68	0.01	0.32	0.09-1.10	0.07
41-50	0.11	0.03-0.35	<0.001	0.24	0.06-0.90	0.04
51-77	0.04	0.01-0.32	0.003	0.10	0.01-0.96	0.05
Baseline ART regimen (PI vs. non-PI based)	4.07	1.49-11.13	0.006	3.12	0.97-10.10	0.06
Baseline calendar year (2009-2012 vs. 2006-2008)	1.25	0.77-2.06	0.39	–	–	–

Ref=referent group, PI=protease inhibitor. * Variables with p -values ≤ 0.20 were included in the multivariable model.

Figure 2. Cumulative incidence of virological failure

Canada, these authors suggested that: support services need to be culturally specific; there is a need for community development and increased community awareness; there should be expanded effort geared towards settlement issues; and HIV providers need to have increased sensitivity and knowledge. Recently, the Canadian Observational Cohort (CANOC) collaboration suggested that female and non-White HIV patients reported higher HIV-related stigma.¹⁶ CANOC concluded that future research should understand “contextual factors, such as culture, country, and rural/urban differences” (p. e48168) when addressing HIV-related issues.

Individual adherence behaviour occurs within an economic, social and cultural context. Accordingly, research needs to consider factors affecting HIV treatment response in a broader social, economic and political context. For example, limited access to HIV information and HIV-related stigma among Aboriginal patients delay access to health care and thus compromise effective medical care.¹⁷ Our study results indicated that CBA patients had poorer HIV treatment outcomes compared to CBNA patients. As a result, treatment outcomes among CBA

patients in northern Alberta may be related to underlying living conditions, collectively known as the social determinants of health, including; education, employment and working conditions; unemployment and job security; food insecurity; housing; income and income distribution; and social exclusion.¹⁸

HIV care, however, involves several stages, including identifying infected individuals, linkage to initial HIV care, long-term retention in care, and ART adherence – the “cascade of care” (COC).¹⁹ Appropriately, the COC has become of concern for areas in public health concerned with maximizing the benefits of ART. For patients and populations to benefit from ART (reduction in HIV incidence and transmission), ART programs have to ensure the complete quality of a cascade of services, from testing and referral to care, to ensuring continued adherence to treatment.²⁰ In many settings, gaps remain in the COC, where few HIV-infected patients actually achieve undetectable VLs, the ultimate goal of HIV treatment and care.¹⁹ These gaps include late HIV diagnosis, suboptimal linkage to care, low retention in care, low ART coverage, and poor ART adherence.¹⁹ Recently, Nosyk et al.²¹ from the STOP HIV/AIDS Study Group were the first group to track the longitudinal changes in the COC in British Columbia, Canada, from 1996 to 2011. This group assessed the proportions of individuals at each stage along the COC. Although their findings suggested that overall engagement in care improved from 1996 to 2011, substantial numbers of patients were lost at each stage, most notably the retention in care stage.

Understanding limiting factors in each step of the cascade is important, while recognizing that what causes patients to be lost from the cascade likely varies within regions and patients. This is particularly important for CBA patients, as CBA patients continue to be disproportionately affected by HIV/AIDS and continue to account for an increasing proportion of new HIV-positive test reports and AIDS diagnoses.¹ Moreover, our results were similar to previous research which suggests that CBA patients continue to experience worse ART outcomes compared to CBNA patients.^{3,4,22}

This is of extreme concern. Perhaps we need to approach caring for CBA HIV patients with a participatory approach, meaning we need to improve care by forming meaningful relationships and partnerships with the patients themselves, the clinicians, and the HIV community service workers, to ensure that patients can successfully navigate their way within the health care system.

This study has numerous limitations, including missing data (i.e., the 26 patients excluded for missing country of origin data), combining immigrants and refugees into a single category to describe FB patients, small sample size, the inherent difficulties of using a clinical database for research purposes, and the retrospective nature of our design. We acknowledge that while we classified immigrant and refugee patients into one category, this group is heterogeneous and encompasses a broad range of characteristics. The use of any classification method, however, is a simplification of reality. We classified patients by country of origin, which has the limitation of ignoring cultural differences within a country and the length of time a patient resides in their birth country or Canada. For example, if a patient self-reported their country of origin as being outside of Canada but having migrated to Canada as an infant, we classified this patient as FB even though this patient may culturally identify as Canadian. Our findings, therefore, may have overlooked important differences between ethnic groups. However, our clinic database defined immigrant and refugees as those patients born outside of Canada, and therefore we did not have access to specific country of origin information.

Our study utilized a retrospective design and relied on a clinical data source for exposure information. Further, our strict exclusion criteria reduced our sample size. This study, however, aimed to investigate ART outcomes among patients prescribed once-daily therapy, the standard of modern HIV care. Despite these limitations, our cohort provided a representative sample of all patients who recently initiated ART in northern Alberta using the NAP database. Previous research has validated this database,²²⁻²⁴ including Martin et al.'s²² recent investigation of HIV treatment outcomes comparing CBA and CBNA patients.

Although FB patients may have potential obstacles to adherence and ART success, our analysis found that ART outcomes among FB patients were similar to those of HIV patients born in Canada. Our findings, however, indicated that CBA patients continue to have less successful ART outcomes compared to CBNA patients. As such, it is critical that researchers, clinicians and community organizations engage with Canadian Aboriginal communities and work together to find innovative and culturally-appropriate strategies to address all stages along the COC, including ART outcomes.

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RÉSUMÉ

OBJECTIF : L'épidémie de VIH et de sida frappe démesurément les populations socialement vulnérables. Depuis 2001, la proportion de patients nés à l'étranger servis par le programme de lutte contre le VIH du nord de l'Alberta a augmenté. Notre étude visait à évaluer les effets de la thérapie antirétrovirale (TAR) dans le nord de l'Alberta, au Canada, chez des patients infectés par le VIH nés à l'étranger auxquels on avait prescrit une dose quotidienne d'antirétroviraux.

MÉTHODE : Nous avons utilisé une étude de cohorte rétrospective en deux volets pour comparer les effets de la TAR chez les patients nés à

l'étranger et les patients autochtones nés au Canada et chez les patients non autochtones nés au Canada. Le 1^{er} volet a fait appel à la régression logistique pour comparer la probabilité d'une suppression virale initiale chez les patients nés à l'étranger (40 %) et les patients autochtones nés au Canada (27 %) et chez les patients non autochtones nés au Canada (33 %). Le 2^e volet a fait appel à l'analyse de survie pour comparer le taux d'échec de la TAR selon le pays d'origine des patients ayant obtenu une suppression virale initiale durant le 1^{er} volet.

RÉSULTATS : Notre échantillon d'étude comportait 322 patients naïfs de traitement (dont 122 nés à l'étranger). Pour le 1^{er} volet, 261 patients ont obtenu une suppression virale initiale moins de six mois après le début de la TAR. Compte tenu de l'âge, du schéma thérapeutique, du risque d'exposition au VIH et de l'année civile, comparativement aux patients non autochtones nés au Canada, la probabilité d'obtenir une suppression virale initiale était significativement plus faible chez les patients autochtones nés au Canada (RC=0,44, IC de 95 % : 0,20-0,96); et similaire à celle des patients nés à l'étranger (RC=0,76, IC de 95 % : 0,33-1,73). Le 2^e volet incluait 261 patients, suivis sur 635,1 années-personne. Compte tenu de l'âge, du sexe, de la numération des lymphocytes CD4 au départ et du régime posologique, comparativement aux patients non autochtones nés au Canada, les patients autochtones nés au Canada et les patients nés à l'étranger avaient des taux d'échec virologique similaires après la suppression virale initiale (indice de risque (IR)=1,54, IC de 95 % : 0,38-6,18; IR=0,49, IC de 95 % : 0,11-2,20, respectivement).

CONCLUSIONS : Notre étude indique que les effets de la TAR chez les patients de l'Alberta nés à l'étranger sont semblables à ceux observés chez les patients non autochtones nés au Canada. Par contre, nos résultats donnent à penser que chez les patients autochtones nés au Canada, les effets du traitement sont moins bons que chez les patients non autochtones nés au Canada. Il est donc impératif que les cliniciens, les chercheurs et le public comprennent mieux les raisons de l'inefficacité relative de la TAR chez les patients autochtones du nord de l'Alberta nés au Canada.

MOTS CLÉS : thérapie antirétrovirale; émigrants et immigrants; VIH-1; effets physiologiques des médicaments; Canada