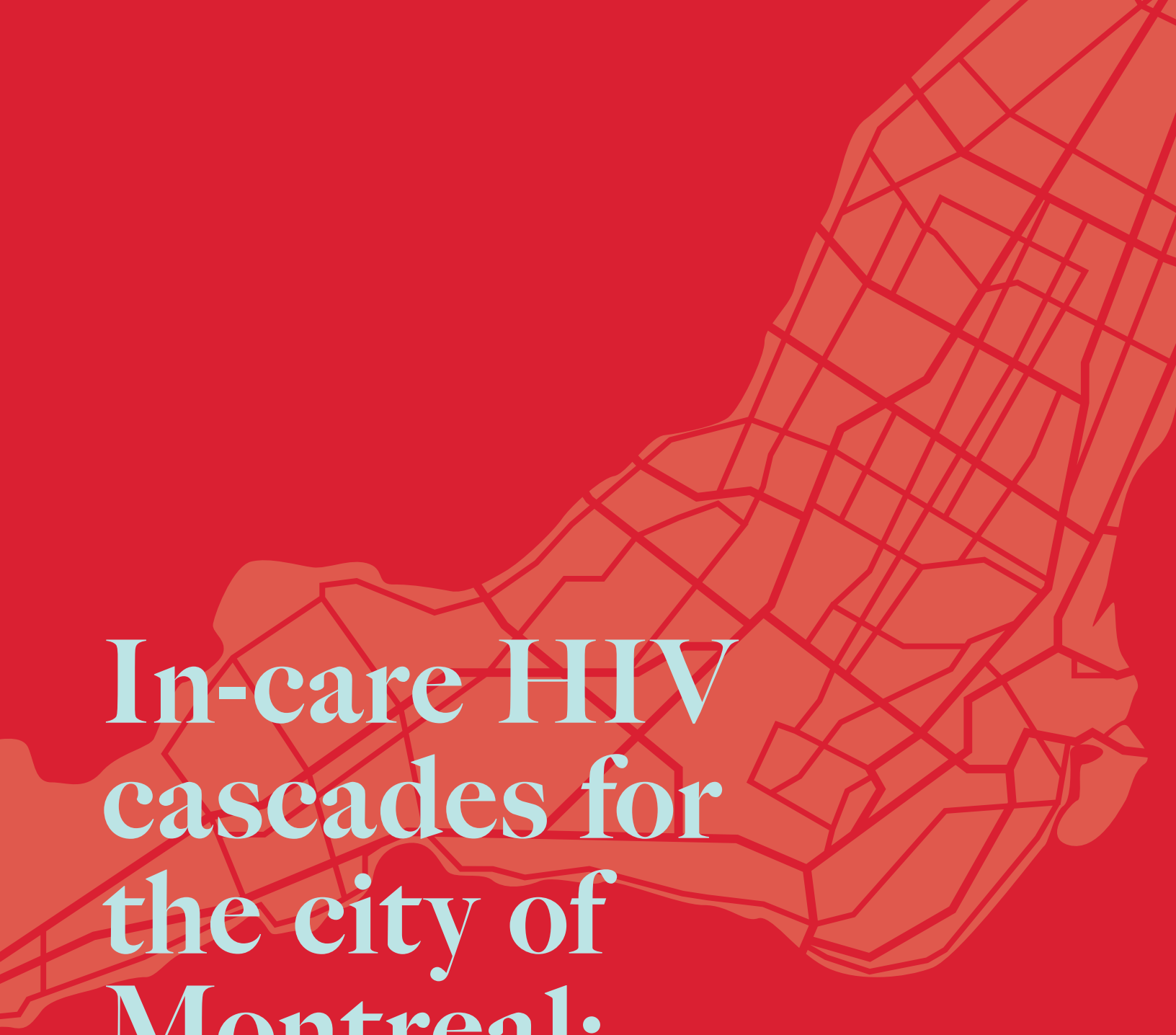


In-care HIV cascades for the city of Montreal:

Data from the Cohorte Montréalaise

Executive Summary - November 29, 2018

Blake Linthwaite, Ndongo Sangare, Helen Trottier, Jean-Guy Baril, Madeleine Durand, Marina Klein, Nimâ Machouf, Costas Pexos, Réjean Thomas, Cécile Tremblay, Anne-Fanny Vassal, and Joseph Cox

Background

On Dec 1, 2017 Montreal signed the Paris Declaration on Fast-Track Cities and joined other Fast-Track Cities across the globe in the fight against HIV/AIDS.[1] Fast-Track Cities commit "to build upon, strengthen, and leverage existing HIV-specific and -related programs and resources to: attain the 90-90-90 targets (90% of people living with HIV (PLHIV) diagnosed, 90% of diagnosed PLHIV on antiretrovirals (ARVs), and 90% of PLHIV on antiretrovirals and virally suppressed); increase utilization of combination HIV prevention services; reduce to zero the negative impact of stigma and discrimination; and establish a common, web-based platform to allow for real-time monitoring of progress."[2] When setting priorities for intervention along the HIV care continuum, an HIV care cascade, a bar graph providing a population level, cross-sectional snapshot of progression along the HIV care continuum, can act as a useful tool for identifying and targeting barriers to HIV care and disease management.[3]

A standard HIV care cascade includes the three steps from the 90-90-90 targets (the number and proportion diagnosed, the number and proportion on ARVs, and the number and proportion virally suppressed). However, many analyses now include additional steps, such as linkage to care (any HIV care visit after diagnosis) and receipt of care (at least one HIV care visit within a year), to further inform deficits in HIV care.[4-6] These additional steps provide information about attrition in the HIV care cascade between diagnosis and viral suppression, and can help guide intervention priorities. To inform improvements to clinical care for PLHIV, the steps after linkage to care, specifically the receipt of care, ARV use, and viral suppression, are of particular importance as these steps provide insight into the quality of care provided to PLHIV already registered with HIV care providers.

Different populations face unique barriers to progression through the HIV care continuum. In Quebec, Canada, men who have sex with men (MSM), people who inject drugs (PWID), people from HIV endemic areas, heterosexual people, indigenous people, and young adults are priority groups with related risks for HIV infection and unique barriers to HIV care.[7] Thus, HIV care cascades specific to these groups could be beneficial for identifying barriers to viral suppression and achieving the 90-90-90 targets.

The Cohorte Montrealaise (CM) includes all PLHIV in the Montreal metropolitan area who have 1) received care at one of four major HIV-specialist care centres (Clinique médicale l'Actuel; Clinique médicale Quartier Latin; Unité hospitalière de recherche, d'enseignement et de soins sur le sida (UHRESS) at the Centre hospitalier de l'Université de Montréal (CHUM); and Chronic Viral Illness Service (CVIS) at the McGill University Health Centre (MUHC)) and 2) had at least two viral load measures in any year since 2000. These clinics have a long history of HIV care provision in Montreal and, together, are thought to provide the large majority of HIV care within the Montreal metropolitan area. The CM has been funded by the réseau SIDA/maladies infectueuses du Québec (SIDA-MI) since inception.

Aims

We aimed to report on a 2015 HIV care cascade for patients participating in the Cohorte Montréalaise. We conducted a cross-sectional assessment of the in-care HIV cascade for 2015, consisting of annual period prevalence estimates for *PLHIV on ARVs* and *PLHIV with suppressed viral loads*. Total *PLHIV who received HIV care* was the denominator for subsequent steps. In-care cascades were produced and stratified by sex and priority group.

Methods

Key definitions

HIV CARE CASCADE: a bar graph providing a population-level snapshot of progression through important aspects of HIV care.[3]

IN-CARE HIV CASCADE: an HIV care cascade, exclusively among PLHIV who received care. PLHIV who received care is the denominator for subsequent steps. We included *PLHIV who received care, PLHIV on ART*, and *PLHIV with suppressed viral loads*, all defined below.

PLHIV WHO RECEIVED CARE: PLHIV with at least one HIV care appointment in 2015.[8,9]

PLHIV ON ARVS: among PLHIV who received care, any documented ARV use in 2015.[3] This includes ARV use started in 2015, and/or prior use without indication of stoppage before 2015.

PLHIV WITH SUPPRESSED VIRAL LOADS: among PLHIV on ARVs, viral loads (VLs) under 50 copies/ml at the end of 2015.[3,10] Patients without VLs in 2015 were not considered virally suppressed.

PRIORITY GROUPS: populations of people who experience similar oppression or stigma, exhibit some common behaviours, and/or have biological vulnerabilities to HIV, which work in concert to put them at risk of HIV infection, disease progression, and/or transmission.[7]

PLHIV who received care is derived from definitions used by Amsterdam and New York.[8,9] Our definition of *PLHIV on ARVs* is consistent with the definition used by the Public Health Agency of Canada (PHAC). All other definitions are adapted from UNAIDS's Global AIDS Monitoring 2017.[3] 50 copies/ml, the detection limit for VLs in Quebec from May 1999 to 2010, was chosen as the cut-off for viral suppression. Studies suggest that there is an insignificant difference in the number of people identified as virally suppressed when using VL cut-offs of 50, 200, or 1000 copies/ml, the cut-offs used by other Fast-Track Cities.[3,10] Thus, our choice of cut-off would not limit comparisons with other Fast-Track Cities. Data limitations, comparability with other clinics and jurisdictions, and clinical relevance were primary considerations for indicator definitions.

In-care cascades

All patients in the CM that received care in 2015 are included in the in-care cascades. Patients who died before the start of 2015 are excluded. The graphs for the in-care cascades are exclusively among patients participating in the CM. In-care cascades are produced considering sex and the following priority groups: MSM; PWID; people from HIV endemic areas; heterosexual people; and young adults.

Results

Sociodemographic and clinical characteristics

Descriptive statistics for the sample are provided in Table 1. In total, 6364 PLHIV had HIV care visits in 2015 at one of the four centres in the CM. The large majority (85%) were males thought to have contracted HIV from sex with other men (MSM; 67%), followed by women (15%), people thought to have contracted HIV from injection drug use (PWID; 11%), people from HIV endemic countries (11%), and people who may have contracted HIV from heterosexual sex (8.5%). On average, patients were 51 years of age and diagnosed with HIV 14 years ago.

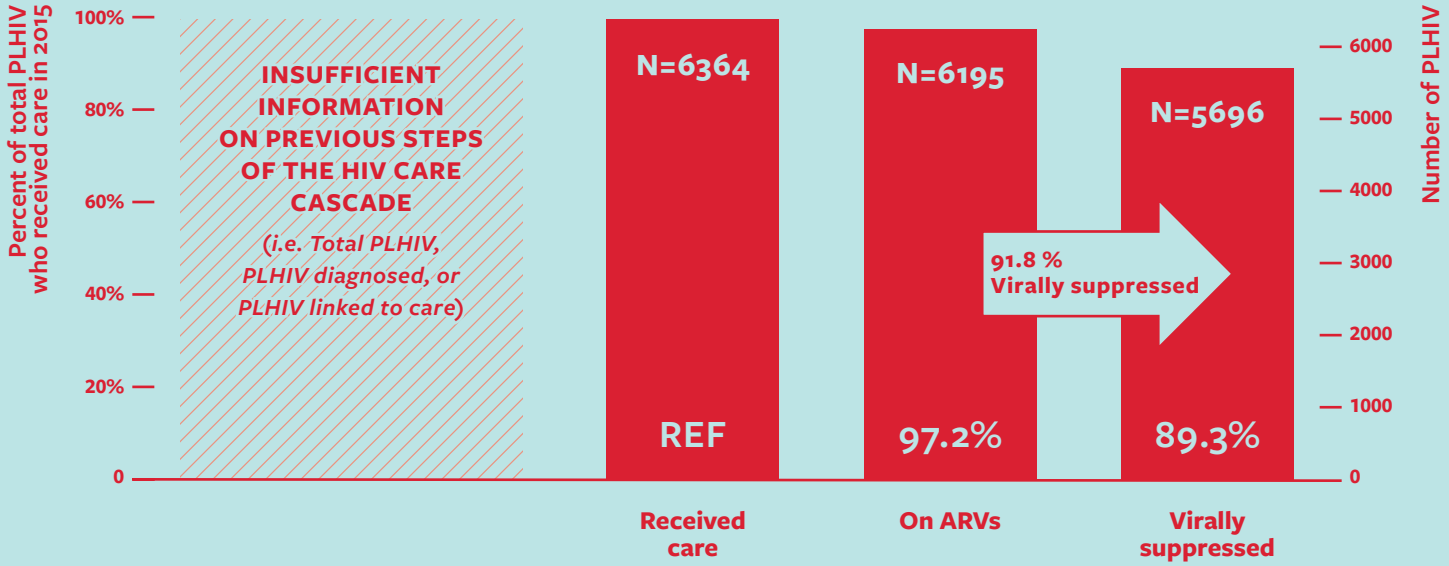
Table 1: Descriptive statistics among patients with visits in 2015 and no recorded death up to January 1, 2015.

Number of unique patients (n)			6364
Number of deaths in 2015, among patients with visits in 2015 (n)			43
Age (Median [IQR])			51 [43, 57]
Sex*	Male	85.2%	5423
	Female	14.8%	938
Priority group (*See "Priority groups" in definitions*)	MSM	66.5%	4234
	PWID	11%	700
	Endemic country	11.2%	712
	Heterosexual	8.5%	542
	Indigenous	0.6%	39
	Young adult	4.4%	282
	Other	0.4%	25
	Unknown	6.9%	437
Number of years since initial HIV diagnosis (Median [IQR])			14 [7, 19]
Number of days from initial HIV diagnosis to start of 1st ARV regimen (Median [IQR])			363 [38, 1461]
Ever tested positive for hepatitis C virus (RNA+ or Ab+)		8.6%	550
Ever tested positive for hepatitis B virus (HBsAG+)		5.2%	329
CD4 cell count, most recent test (Median [IQR])			610 [440, 808]

**Sex defined by clinical records, unclear if sex at birth or self-report.*
IQR=Interquartile range

In-care HIV cascade: All CM participants, 2015

Before exploring the in-care HIV cascades, please ***review the METHODS*** *section for key definitions*



Some assumptions were made that could affect results. Notably:

i. Patients with visits (i.e. who received care) in 2015 but did not have any VL measures in 2015 (n=180) were considered as not virally suppressed;

ii. Patients with suppressed VLs and missing ARV information were considered *On ARVs*; and

iii. We assumed that all people who were prescribed ARVs in 2015 took them.

Assumption i provides a more conservative estimate of the proportion of PLHIV who received care and are *Virally suppressed*.

Assumption ii was used to correct for patients on ARVs but whose ARV information was not available. This has the effect of increasing the number of patients *On ARVs* compared to if no correction had been made. This does not account for the very small number of so-called "elite controllers" who have suppressed viral loads without taking ARVs.

Assumption iii is a necessary assumption, since we have no way of knowing if patients filled their prescriptions or actually took the ARVs they were prescribed. This means that a small number of people who were prescribed ARVs in 2015, but did not actually take them, would still be considered *On ARVs*. However, these people would likely not have been virally suppressed.

Thus, because of our conservative estimate for viral suppression (i.) and the possibility of a slight inflation in the number of people *On ARVs* (ii. & iii.), *we may have slightly underestimated the last step in the 90-90-90 cascade* (91.8%).

In-care HIV cascades: By priority group, 2015

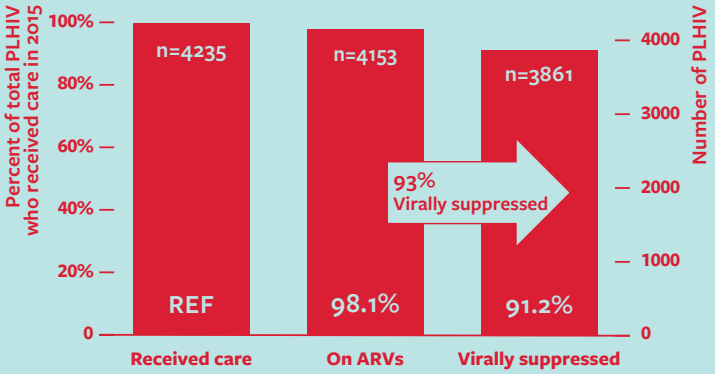
An individual can be classified into one or multiple priority groups. For example, a man who has sex with men and has used injection drugs would be classified into both the MSM and PWID categories. This person would be included in each of the MSM and PWID cascades.

Only a minority of people (n=773) in the cohort are classified into multiple priority groups.

For further information, consult the definition for "priority groups" in the Methods section and the priority group-specific definitions provided alongside each cascade.

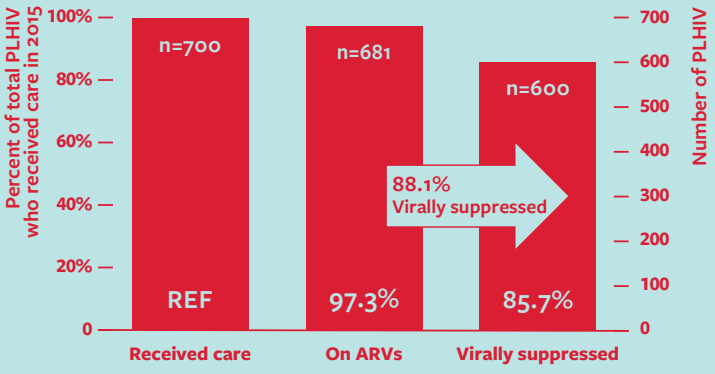
Men who have sex with men (MSM)

Gay, bisexual, two-spirit and other men who may have acquired HIV through sex with men.[11]



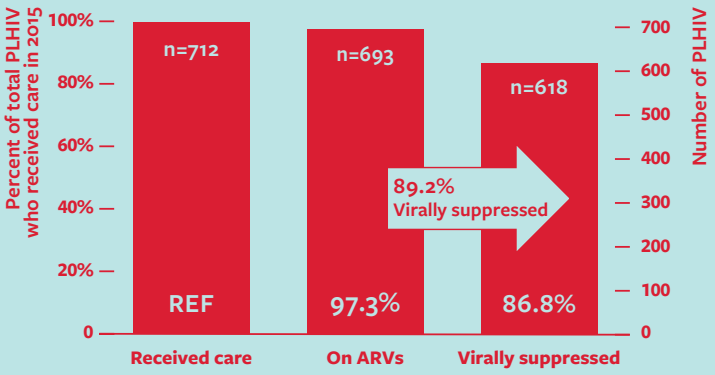
People who inject drugs (PWID)

People who may have acquired HIV from injection drug use.[11]



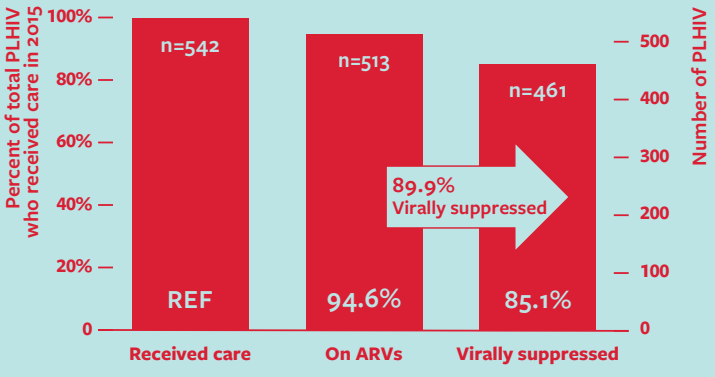
People from HIV endemic areas

People from a country that has an adult prevalence (ages 15-49) of HIV that is 1.0% or greater and one of the following: (1) 50% or more of HIV cases attributed to heterosexual transmission; (2) a male:female ratio of 2:1 or less; or (3) HIV prevalence greater than or equal to 2.0% among women receiving prenatal care.[12]



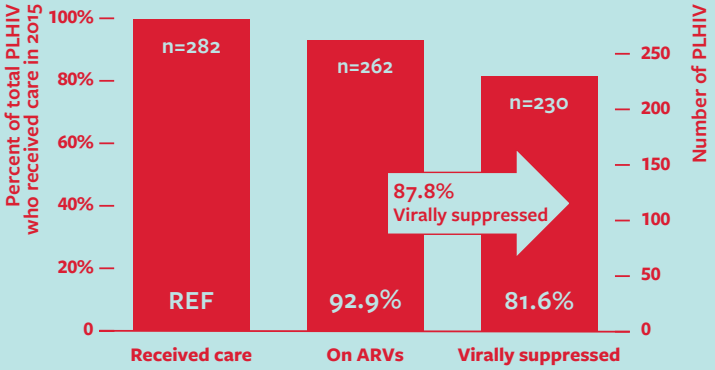
Heterosexual people

People whose HIV status can likely be attributed to heterosexual sex, do not inject drugs, are not men who have sex with men, and are not people from an HIV endemic area.[11]



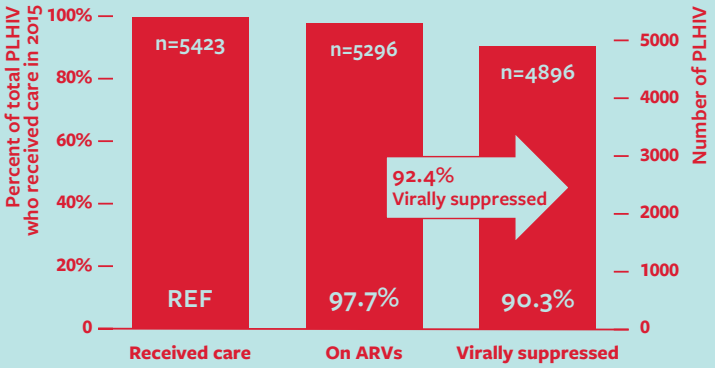
Young adults

People of age 15-29.[13] Given that centres in the CM only provide care to adults, we will consider 'Young adults' as people aged 18-29.

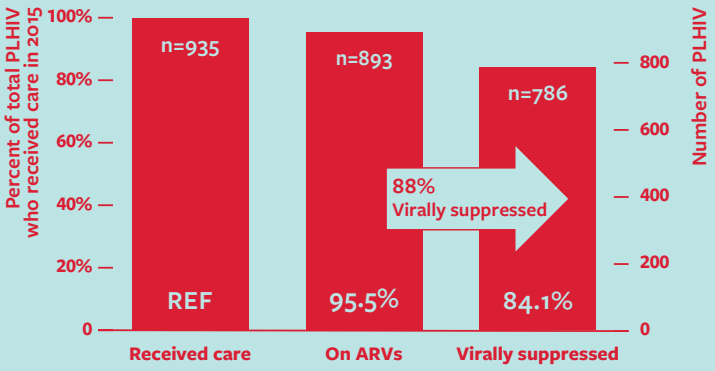


Female and male sex*

Men



Women



**Sex defined by clinical records, unclear if sex at birth or self-report.*

Conclusions

Globally, Montreal met the third target of the 90-90-90 initiative in 2015 (over 90% of PLHIV on ARVs are virally suppressed) but gaps remain for specific populations of PLHIV. Overall, 97.3% of PLHIV who received care in 2015 also received ARV treatment, and 91.8% of these people achieved viral suppression. Based on sub-analyses, the number and proportion of PLHIV who received care and received ARV treatment appears to have increased since 2012, with 5859 (92.8%) on ARVs in 2012, 5984 (94.3%) in 2013, 6082 (96%) in 2014, and 6195 (97.3%) in 2015. These improvements in ARV uptake are consistent with evidence demonstrating the benefits of early treatment initiation and guidelines supporting treatment as prevention.[14-17] Viral suppression appears to have increased as well (88.1% in 2012 to 91.8% in 2015). Among the priority groups of PLHIV considered, **4.5% of women, 5.4% of heterosexual people, and 7.1% of young adults who received care in 2015 were not on ARVs,** indicating that interventions to support ARV treatment uptake are needed. **Among people on ARVs in 2015, 10.8% of people from HIV endemic countries, 11.9% of PWID, 12% of women, and 12.2% of young adults were not virally suppressed;** reasons for these outcomes should be explored.

This report creates HIV care cascades for the city of Montreal and builds upon past efforts.[18] The use of stratified in-care cascades allows for more specific reporting of HIV care performance and can offer clues for improvements to the global HIV care cascade in Montreal. However, we encountered some limitations in our analyses:

- Other HIV clinics in Montreal are not included in the CM, and the exact size of their patient pool is unknown.
- We could not create a continuous HIV care cascade from diagnosis to viral suppression for Montreal because the CM has no information about patients who have moved away, are being followed elsewhere, or have fallen out of HIV care. As a result, it is impossible to discern the patients who are active in care elsewhere from those who have fallen out of HIV care. These unknowns are represented by the text at the start of our cascade for 2015.
- Ethnicity and self-identified gender are not collected systematically, meaning we could not produce cascades for trans or indigenous people.
- Inclusion in the CM does not necessarily reflect residency in Montreal, as the four clinics in the CM also provide care for a minority of non-residents.

Despite these limitations, we believe our in-care cascades are plausible representations of the HIV care experience for PLHIV who received care in Montreal. This assertion is supported by two factors: 1) the stability in the number of PLHIV who received care from 2012-2015 (6313, 6345, 6333, and 6364, respectively; related in-care cascades not presented here), and 2) the fact that our estimate of the number of PLHIV who received care in 2015 (n=6364) is within a reasonable range of our estimate of the number of PLHIV who know their status in Montreal, based on PHAC and INSPQ figures[7,12,19,20] (n=9184 [lower bound: 7350; upper bound: 11019]; extrapolated from 2014 estimates), assuming some attrition between diagnosis and receiving care in 2015, and that approximately 2000 PLHIV are thought to be followed at other clinics in Montreal.

Further enhancements in data collection related to the CM would improve our ability to evaluate HIV care in Montreal. Firstly, more systematic collection of some information (e.g. gender, indigenous ethnicity) would improve our ability to evaluate HIV care in target groups. Secondly, methods for differentiating patients who are active in care elsewhere from those who have fallen out of HIV care should be explored. Finally, a more robust data reporting system is needed, ideally in real-time and including all centres following PLHIV or screening for HIV in Montreal. The results from this analysis encompass only a subset of PLHIV in 2015 and the HIV cascade for Montreal may have already changed. New phenomena related to the HIV epidemic, such as changing immigration patterns[21], pre-exposure prophylaxis (PrEP)[22], and rising rates of drug use during sex (chemsex)[23] could have effects on the numbers of people needing and engaging in care. A better data reporting system would permit analyses of changing trends in the epidemic as they happen, while enabling faster and better coordinated responses.

We believe this report may help guide care priorities and interventions for various groups of people in HIV care in Montreal.

Acknowledgements

We would like to thank: CM participants and other PLHIV in Montréal; the four clinics who contributed to the CM, including Clinique médicale l'Actuel, Clinique médicale du Quartier Latin, UHRESS-CHUM, and CVIS-CUSM; and the réseau SIDA/maladies infectueuses du Québec (SIDA-MI), who has funded the CM since inception.

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