M-124

The Evolution of the Cascade of HIV Care in British Columbia, Canada: 1996-2009

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Background

- To achieve a reduction in HIV transmission, HAART programmes must ensure the effectiveness and quality of a cascade of services from testing and referral to care to ensuring ongoing adherence to HAART.
- The cascade of HIV care has become a focal point globally for implementation efforts to maximize the individual and public health impact of HAART.
- This study characterized longitudinal patterns of engagement in HIV care for all HIV-positive individuals in BC from the start of the HAART era in 1996 through 2009

Methods

Data was drawn from a number of sources :

•Annual estimates of HIV prevalence for BC were derived from the Public Health Agency of Canada.

•Data on HIV testing was drawn from the BC Centre for Disease Control (BCCDC)

•Data on pVL and CD4 cell count testing, as well as HAART use were extracted from the BC Centre for Excellence in HIV/AIDS (BC-CfE) population-based registries. The BC-CfE has complete capture of pVL testing data and an estimated 80% of CD4 testing data.

These databases were supplemented with :

i.The Medical Services Plan physician billing database, capturing all services billed by physicians in the province, including HIV-related physician visits,

ii.The provincial Discharge Abstract Database, capturing hospital inpatient care;

iii.The BC PharmaNet database, capturing all non-ARV medication dispensations; and

iv.The BC Vital Statistics database, capturing mortality.

The cascade of HIV care, as articulated by Gardner et al., featured seven distinct stages, with the final stage including those either adherent to HAART or having an undetectable pVL. In this study, we have separated this final stage into two distinct stages.

Table 1. Operational definitions for the eight stages of the cascade of HIV care

HIV-infected	Based on HIV prevalence estimates reported by the Public Health Agency of Canada (Fig 1).
HIV-diagnosed	Defined as the first instance of one of the following: (i)confirmed HIV-positive test (ii)detectable pVL[1] (iii)HIV-related MSP billing or hospitalization (iv)reported AIDS-defining illness (v)antiretroviral treatment dispensation
Linked to HIV care	Among diagnosed cases; defined as: (i)Among those with confirmed HIV test: the first instance of HIV-related service[2] following HIV diagnosis (ii) Among those with no confirmed HIV test: the first instance of HIV-related service[2] ≥ 30 days following derived HIV diagnosis date
Retained in HIV care	Among individuals linked to HIV care; defined as: (i) HIV-related physician visits OR diagnostic tests (CD4 or pVL) ≥3 months apart within the calendar year OR (ii) At least 2 antiretroviral drug dispensations ≥3 months apart, within the calendar year.
Need antiretroviral therapy	Among individuals with any record of CD4 and/or pVL: Individuals qualify if they have reached the current primary or secondary IAS-USA initiation criteria within the calendar year: 1996: CD4<500 OR CD4>500 if pVL≥ 30,000 or ADI; 1997-99: >5000 PVL or ADI; 2000-01: CD4<500 OR CD4>500 if pVL≥ 30,000 or ADI; 2002-2007: CD4≤200 or ADI; 2008-09: CD4≤350 or ADI
On antiretroviral therapy	Among those in need of antiretroviral therapy; defined as receiving at least two antiretroviral drug dispensations ≥3 months apart, within the calendar year.
Adherent to therapy	Among individuals on antiretroviral therapy; defined as having at least 80% adherence[3] in the calendar year, or from the point of antiretroviral initiation for those beginning therapy within the calendar year.
Undetectable plasma viral load	Among individuals adherent to therapy, defined as having no detectable pVL[1] over a period ≥3 months in duration within the calendar year.

MSP: Medical Services Plan[1] Based on pVL testing technology available at the time of measurement. As reported previously (Montaner et al, 2010), pVL measurements became available in June, 1996; pVL<500 was deemed undetectable in 1996, a threshold of pVL<400 was set for 1997-1998, and a threshold of pVL<50 was set from 1999 through the end of follow-up using current technology; [2] pVL test OR CD4 test OR HIV-related physician visit OR antiretroviral dispensed; [3] refers to the number of days of medication dispensed, divided by the total number of days of follow up.

Results

- Estimates of annual HIV prevalence from the Public Health Agency of Canada (PHAC), along with empirically-derived estimates of diagnosed cases are presented in Figure 1
- The number of HIV diagnosed is defined in Table 1 and in a previously published paper: (1), Nosyk et al.

Figure 1. Estimated HIV prevalence for BC, 1996-2009

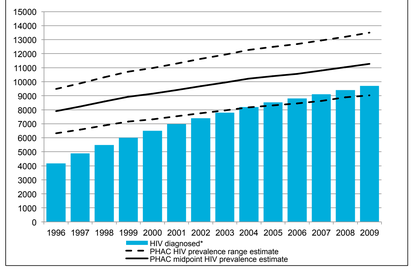
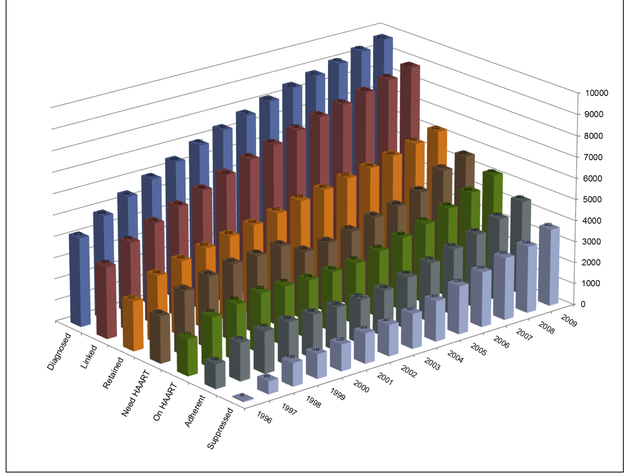
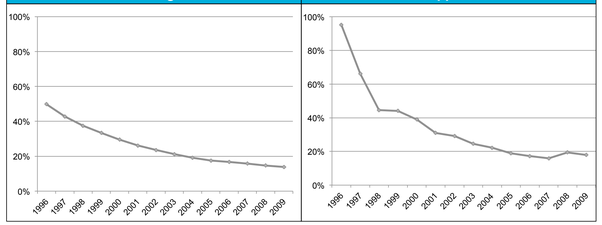


Figure 2. The Cascade of HIV Care in British Columbia, Canada: 1996-2009



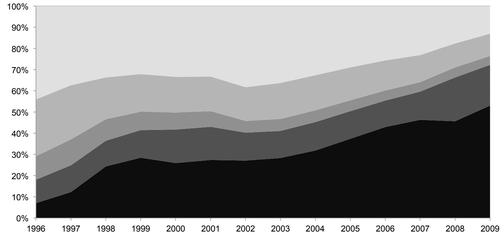
- The percentage of HIV-positive individuals diagnosed increased from 53% in 1996 to 86% in 2009.
- While rates of linkage to HIV care were 8-10% below diagnosis, levels of retention in HIV care lagged far behind linkage figures, reaching 63% of diagnosed cases through 2009.
- The levels of those needing, and accessing HAART were close to the retention in HIV care figures, save for the period of 2000-2006.
- The percentage of HIV-positive individuals with virologic suppression increased from 2% in 1996 to 32% (range: 27% - 37%) in 2009, with steep increases from 1996 to 2000 (2% to 14%) and 2003 to 2009 (16% to 32%)

Figure 3. Changes cascade of HIV care leakage in British Columbia, Canada: 1996-2009



- The percentage of those infected but undiagnosed fell from 53% to 14% during the study period
- The greatest gains were realized in viral suppression – those adherent but not suppressed decreased from 95% in 1996 to 20% in 2009.

Figure 4. Aggregate highest pVL measurement for HIV Positive individuals in British Columbia, Canada: 1996-2009



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Denominator	2882	3864	4227	4440	4627	4895	5090	5302	5569	5744	5877	6159	6334	6596
Active on HAART*	837	1960	2597	2994	3079	3120	3211	3356	3585	3913	4255	4654	5123	5413
Total # pVL tests	4896	10803	12930	14117	15888	17673	19663	21259	22677	23110	23815	24897	26009	26818

Virologic suppression threshold: pVL<500 for 1996, pVL<400 for 1997-98 and pVL<50 from 1999-2009

- It is critical to note the decreases across each pVL strata over time, in addition to the gains in levels of pVL suppression

Conclusion

Careful mapping of the cascade of care is critical to understanding what further efforts need to be deployed to maximize the impact of currently available interventions, and as a result, to inform efforts to contain the spread of HIV/AIDS. In particular, further efforts have to be made to ensure that patients are retained in HIV care.

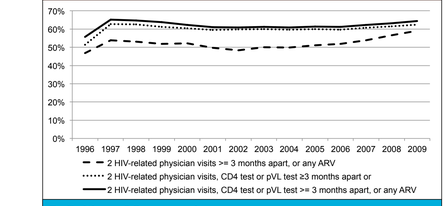
References

1. Nosyk B, Colley G, Chan K, Yip B, Health K, Hogg RS, Harrigan PR, Montaner JSG, on behalf of the STOP HIV/AIDS Study Team. Application of case-finding algorithms for identifying individuals with human immunodeficiency virus from administrative data in British Columbia, Canada. In press, PLoS One

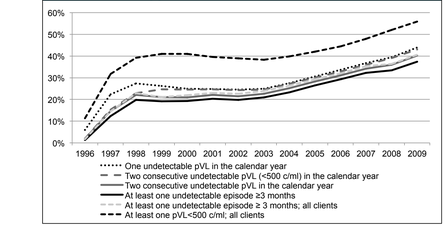
Sensitivity Analysis

Figure 5. Sensitivity Analyses

Definition of Retention

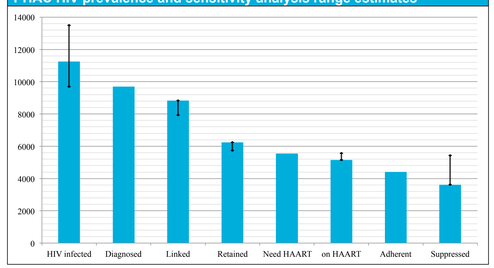


Definition of Suppression



- Excluding CD4/pVL testing from definitions of linkage and retention in HIV care resulted in figures up to 20% below baseline definitions
- Our most conservative definition of suppression, requiring an episode with suppressed pVL measures at least three months apart positively classified up to 38% of diagnosed cases in 2009

Figure 6. Cascade of HIV Care in British Columbia, 2009: Including PHAC HIV prevalence and sensitivity analysis range estimates



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