

## Completeness of HIV/AIDS lab reported data from 2009-2013 in King County, WA

### Background

Regular medical care for HIV infection includes the monitoring of two laboratory tests, CD4+ T-lymphocyte counts and plasma viral load levels. Care recommendations for individuals with HIV who have been on antiretroviral therapy for at least 2 years, are consistently virally suppressed, and have a CD4 count  $>300$  cells/mm<sup>3</sup> include testing for CD4 annually and testing for viral load at least every 6 months<sup>1</sup>. These lab tests are often used as a proxy for receipt of regular medical care. Since 2006, both tests have been reportable in Washington State regardless of the lab result value, which newly included undetectable viral loads and CD4 counts that are not AIDS defining ( $<200$  cells/mm<sup>3</sup>). It has been a challenge to quantify the degree of compliance with this changed reporting requirement. Without knowing the completeness of laboratory reporting in King County, the validity of summary measures of CD4 and viral suppression status for the King County Persons Living with HIV (PLWH) population is called into question. With planning and evaluation of prevention and treatment programs often tied to the Care Cascade, it is a goal of the PHSKC Epidemiology & Surveillance unit to generate valid estimates of viral suppression status. The purpose of this project was to (1) assess the completeness of reported HIV labs, (2) rectify missing data if possible, and (3) identify any systematic biases in reporting.

### Methods

The Enhanced HIV/AIDS Reporting System (eHARS) is a browser-based application provided by the Centers for Disease Control and Prevention (CDC) to facilitate the collection, management, and reporting of HIV/AIDS surveillance data. Data on HIV viral load and CD4 count is also collected via medical chart review in supplementary surveillance projects, including the Ambulatory Care Evaluation (ACE), Medical Monitoring Project (MMP), and Case Surveillance Based Sampling (CSBS). ACE is a quality assurance assessment of Ryan White funded clinics. MMP is a national surveillance project conducted in 23 jurisdictions, yielding a nationally representative sample of "in care" PLWH. CSBS is similar to MMP, but it samples participants directly from HIV case surveillance data to also capture those who are not receiving care.

To assess the completeness of eHARS viral load and CD4 data, we estimated the percent of eHARS labs that matched to those collected by ACE/MMP/CSBS. The initial match was achieved by merging ACE/MMP/CSBS data with eHARS data using SAS (version 9.3), linking by state identification number, sample date, and lab

result. Since we only had the month and year of the ACE labs, they were considered a match if they had the same result from the same month and year. MMP and CSBS labs included the day of the lab, and eHARS labs were considered a match if their sample date was within 7 days of the MMP/CSBS lab. ACE/MMP/CSBS labs that did not match to eHARS labs were individually investigated by a trained researcher. The researcher determined why each lab did not match and categorizing non-matches to detect patterns. Some common reasons why ACE/MMP/CSBS labs did not successfully link to eHARS were data discrepancies, research study participation, or patient residence outside of King County.

### Results

The estimated percent completeness of eHARS CD4 data had an increasing trend from 2009-2013 (Figure 1), and completeness was never below 90% during that time period. The estimated percent completeness of eHARS viral load data also had an increasing trend from 2009-2013 (Figure 2), but the lab data from 2009 was only 60% complete.

We assessed whether percent complete differed by suppression status ( $<200$  versus  $\geq 200$  copies/mL) and CD4 count ( $<350$  versus  $\geq 350$  cells/mm<sup>3</sup>). There was no evidence of differential reporting in 2011-2013, but in 2009-2010, suppressed viral load tests appeared to be less likely to be reported (Figure 3). In 2009, 50% of suppressed labs and 6% of non-suppressed labs were missing in eHARS. In 2010, 25% of suppressed labs and 9% of non-suppressed labs were missing. There was no evidence of differential reporting by CD4 level (Figure 4).

To assess how low percentages of completeness might affect estimates of suppression, we ascertained whether both ACE and eHARS classified a patient as suppressed during a given sample year, regardless of the specific dates of the samples. After discounting actual sample dates, the completeness improved dramatically from 60% to 92% in 2009 (Figure 5).

Through the investigation of missing labs, we found a large portion of CD4 count labs from December 2009 and January 2010 from the same laboratory that appeared to be missing in eHARS (Figures 6 and 7). An investigation at the Washington State Department of Health determined that the labs were missing from both the county and state lab data. It is still unknown why these labs were missing, but the investigation will continue.

## Discussion

The completeness of lab reporting data has improved over time. We estimate that 95% of CD4 labs and 97% of viral load labs were in the 2013 eHARS data, which lends credibility to the estimates of care status generated from eHARS data. The estimates of the completeness of HIV/AIDS lab reporting data allows for the adjustment of the viral load suppression estimates on the Care Cascade and more accurate estimates of unmet need. It also provides an adjustment factor to be used, to adjust for laboratory reporting completeness when making population based projections of the proportion of people living with HIV who are engaged in medical care.

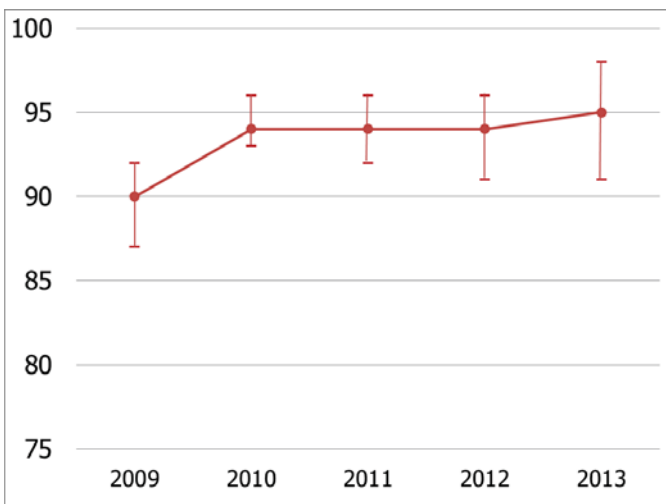
Overall, labs had a high percentage of completeness, but the differential reporting of viral load labs in 2009 and 2010 and large portion of missing CD4 count labs in December 2009 and January 2010 require further investigation.

**Submitted by Marielle Goyette**

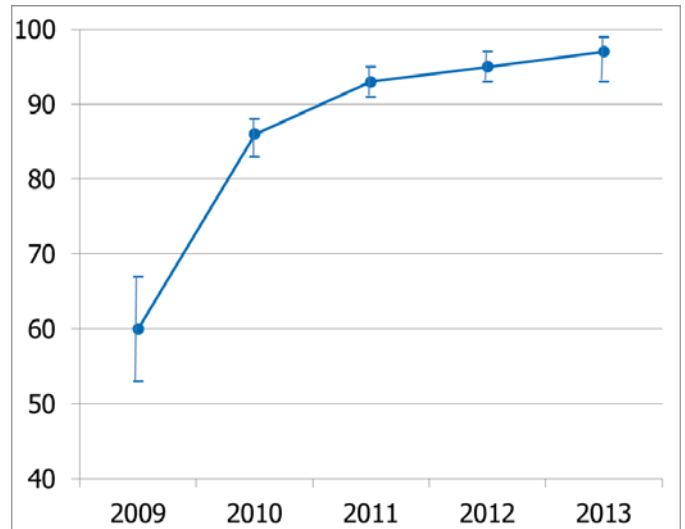
## References

1. Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1 infected adults and adolescents. Department of Health and Human Services. Available at <http://aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf>. Section accessed August 20, 2014, Page C2, Table 3.

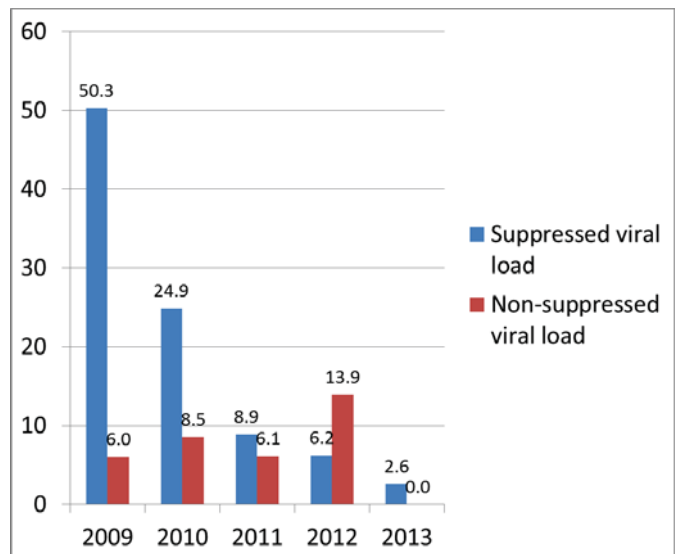
**Figure 1. Percent completeness of eHARS CD4 labs by sample year**



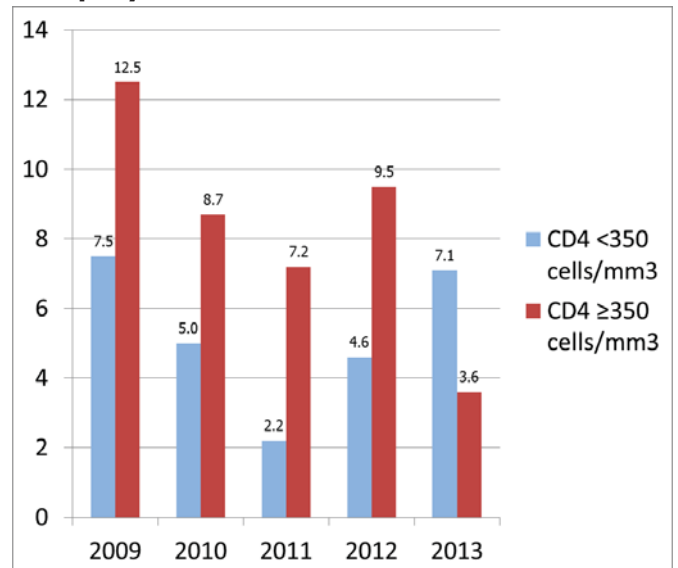
**Figure 2. Percent completeness of eHARS viral load labs by sample year**



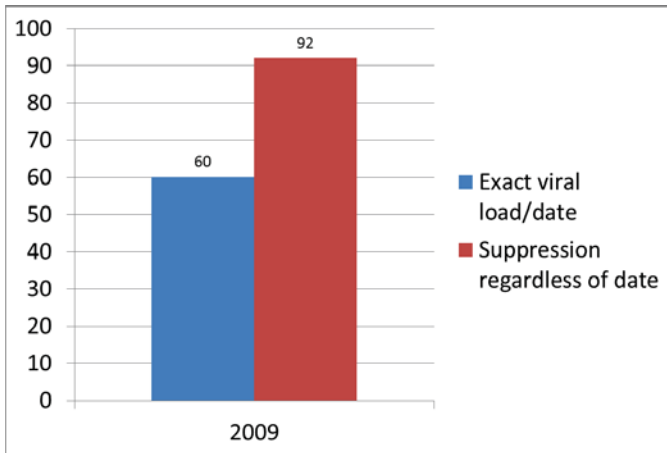
**Figure 3. Percent missing by viral load suppression status by sample year**



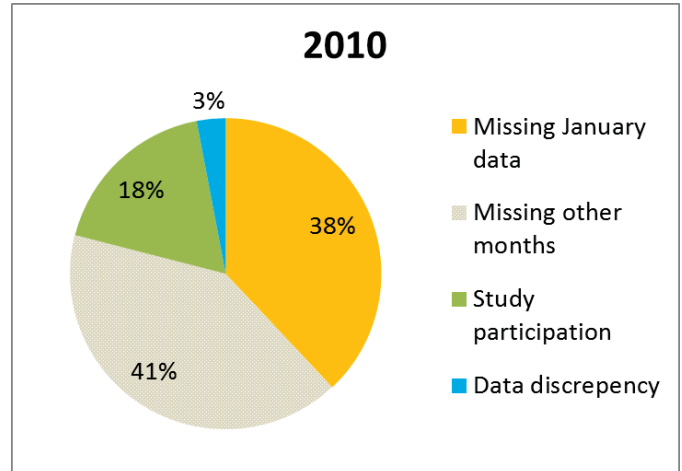
**Figure 4. Percent missing by CD4 level by sample year**



**Figure 5: Completeness of 2009 viral load suppression estimates regardless of sample date**



**Figure 7. Reasons eHARS CD4 count labs did not match to ACE/MMP/CSBS in 2010**



**Figure 6. Reasons eHARS CD4 count labs did not match to ACE/MMP/CSBS in 2009**

