Background
The San Francisco Department of Public Health has aggressively prioritized expansion and frequency of HIV testing, linkage to and retention in care, and, moved toward earlier initiation of antiretroviral therapy (ART), including issuing guidelines recommending evaluating all HIV-positive individuals for ART. We hypothesized that these efforts would reduce community viral load (CVL) and result in fewer new HIV infections.

Methods
Using active case surveillance data from San Francisco’s comprehensive HIV/AIDS case registry, we assessed secular trends in mean CVL at diagnosis, ART initiation, and time to virologic suppression using meta-regression methods. We estimated CVL in four ways: average of the most recent, minimum, and maximum viral load (VL), for each case in the past year, and by log transformation of the mean of the most recent VL. We assessed the relationship of these four CVL measures to newly diagnosed and reported HIV cases using Poisson regression.

Results
Mean CVL at diagnosis remained consistently >400 (p = 0.07), while mean CVL at ART initiation increased from 357 to 445 between 2007 and 2009. From HIV diagnosis to virologic suppression decreased from 32 months in 2004 to 5 months in 2009 (p = 0.001), with time from ART initiation to virologic suppression decreasing from 18.8 months in 2004 to 2.8 months in 2009 (p < 0.001). As shown in Fig. 3, most recent, minimum, and maximum measures of CVL all declined significantly during 2004-2009 (p<0.001, p=0.003, and p=0.010) and were associated with decreases in newly diagnosed and reported HIV cases (p<0.001) and also significantly associated with a decrease in newly diagnosed and reported HIV cases (p<0.001).

Limitations
Our analysis is limited by excluding undiagnosed (estimated 15-20%), acutely infected, or individuals who did not have VL data reported. ART initiation information collected through active surveillance is less complete than Vital Statistics data; Reporting lag may overestimate findings for 2009. Despite these limitations, we are confident in our results given our past multiple imputation analysis modelling missing VL, capture-recapture analysis suggesting 90% completeness of HIV case reporting, and the comprehensive nature of mandatory VL reporting.

Conclusions
Since 2004 and substantially in the last year, there have been notable gains in San Francisco’s efforts to offer individuals earlier treatment and reduced time to virologic suppression, which has been associated with reductions in the community viral load and correlates with decreased newly diagnosed and reported HIV cases. We document individual and population-level successes in our prioritization of prevention towards diagnosing, providing care, and preventing transmission of HIV.

SUMMARY & THE WAY FORWARD
- In the setting of San Francisco’s increasingly coordinated comprehensive HIV/AIDS strategy, we have seen significant improvements in the new metrics of time from diagnosis to ART initiation and time from diagnosis to virologic suppression
- By year of diagnosis, 4 and 12 mo. suppression rates increased significantly from 2004-2009
- All four approaches to calculating CVL are robustly associated with reductions in newly diagnosed and reported HIV cases. These have been associated with reductions in the community viral load and correlates with decreased newly diagnosed and reported HIV cases.

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