HIV Prevention and Mapping
Community Viral Load

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The Domestic HIV Epidemic Continues

Adapted from: El-Sadr, et al. NEJM, 2010
HIV Incidence, United States

- HIV incidence peaked in 1984-1985 at 130,000 infections/year
- Approximately 53,600 new infections each year stable since 2000
- Incidence highest among MSM compared with other risk groups
  - 53% of new infections among MSM
  - 42 times higher compared with heterosexual men
  - Black MSM 9-fold higher incidence compared with white MSM
- Incidence stable among women since early 1990s
  - Approximately 20,000 new infections per year

Hall, et al. JAMA, 2008
Principles Guiding San Francisco’s Approach to HIV Prevention

- Efficient and effective use of limited resources
  - Prioritizing based on scientific data, community input, scalability, and cost
- Case finding
  - HIV testing scale-up
- Interruption of transmission
  - Condoms, syringe distribution, drug treatment
- Universal care and offer of treatment
  - Reduce viral load
- Population-based monitoring
  - Determine the effectiveness of our approach
What would be an optimal HIV population-based indicator of success?

• Marker of both prevention and treatment
• Tells you where epidemic is in community
  • Helps target resources efficiently
• Identifies disparities
  • Helps set goals for achieving health equity
• Temporally upstream of new HIV infections
  • By the time you have an HIV case to report, you’ve failed to prevent that case
Community Viral Load (CVL)

- Population-based measure of a community’s viral burden → Virometer
- Potential biologic indicator of the effectiveness of:
  - Antiretroviral treatment
  - HIV prevention

**Hypothesis:** Reductions in SF’s CVL associated with fewer HIV infections
Calculation of CVL

- Used San Francisco’s comprehensive HIV/AIDS surveillance system
- Calculated two measures of CVL:
  - Total: \[ tCVL = \left( \sum_{i=1}^{n} \text{mostrecentVL} \right) \]
  - Mean: \[ mCVL = \frac{\left( \sum_{i=1}^{n} (\text{mostrecentVL}) \right)}{n} \]
Spatial Distribution of Total CVL by SF Neighborhood, 2005-2008
Spatial Distribution of Mean CVL by SF Neighborhood, 2005-2008

Mean Viral Load (copies/mL)
- above 30,000 copies
- 28,001-30,000
- 23,348 - 28,000
- below 23,348 (SF mean)

Bayview circle
Mean CVL and New HIV Infections, 2004-2008


Mean CVL and Newly diagnosed and reported HIV cases

Year: 2004 2005 2006 2007 2008
Mean CVL: 798 642 523 518 434
Newly diagnosed and reported HIV cases: 935 (CI: 658, 1212) 792 (CI: 552, 1033) 621 (CI: 462, 781)

Mean CVL (p= 0.028)
Newly diagnosed and reported HIV cases (Mean CVL & newly diagnosed HIV p=0.005)
HIV Incidence (Mean CVL & HIV-incidence p=0.3)

CVL: New York & Washington D.C.


**Recommended Action**

**Measure and utilize community viral load:** Ensure that all high prevalence localities are able to collect data necessary to calculate community viral load, measure the viral load in specific communities, and reduce viral load in those communities where HIV incidence is high.

*Decrees in Community Viral Load Are Accompanied by Reductions in New HIV Infections in San Francisco*

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High Impact Combination Prevention
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