HIV Community Viral Load in Florida: Methodology, Feasibility, and Implications

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Viral Load in Individuals

- Studies have shown that people with higher viral loads are more likely to infect others.
- Also, people who are not aware of their HIV infection generally have higher viral loads.
- People who are aware of their HIV status and are on ARVs have lower viral loads.
What is Community Viral Load?

- Community viral load is a term that refers to the overall level of HIV virions in a predefined “community” of people
  - Definition of your community can be variable, but it needs to be fixed before starting analysis
    - Geographic: County, EMA, MSA, etc.
    - Social: MSM, IDU, etc.
    - Need to look at where people in your area are likely to become infected
  - Measured as the average number of virions in your community for a given time frame
    - Reported as copies/mL

Studies have shown:

- High rates of unknown HIV infections as well as low rates of ARV treatment among communities lead to a higher community viral load as compared to other communities.
  - This higher community viral load leads to more efficient transmission and higher infection rates.

- Statistically significant correlation between median community viral load and incidence of new HIV infections.
  - Found that when the median community viral load was <20,000 copies/mL there was no longer an association with HIV incidence.


Why Do We Care About Community Viral Load?

- Community viral load can be used as a proxy measure for the likelihood of infection within that community
  - As community viral load decreases, the likelihood of new infections decrease (opposite is true as well)
- Can also be used as a measure of outreach and linkage to care efforts
  - Used for program evaluation and continued targeting of hard to reach populations

Which Groups of People Do You Need Data on for This Type of Analysis?

1. All people known to our data system who are currently receiving care
   - People designated as “in care” are those that have ANY recent laboratory results
   - Broken down into 3 smaller groups based on viral load test results
     - VL=undetectable
     - VL=detectable
     - In care, but no VL
       - A person has recent CD4 labs but no viral load results, then they fall into “In care, no VL”

2. All people known to our data system who are not receiving care
   - Have no recent laboratory results of any kind

3. People who are HIV infected but they have never been reported to the data system
   - Considered “undiagnosed”
   - Have never been tested, were tested anonymously, were never reported by the lab or physician, etc.
Why Do I Need to Know All of These Groups?

- Knowing which group each person falls into is essential to knowing how to interpret the data.
- If you are missing data on a group it limits the types of analysis you can do.
- Knowing the data by group allows you to track your progress over time.
  - Example: If a CVL increases dramatically from 2009 to 2010 does that mean that your prevention and linkage programs are failing?
  - Not necessarily. It could be that you started a large testing initiative and you are identifying a large number of previously undiagnosed cases. These people will typically have higher viral loads when they are first identified and might affect your calculations.
**How Do the Groups We Just Talked About Fit Together?**

### Population Groups Included

<table>
<thead>
<tr>
<th>Population Viral Load</th>
<th>In care with undetectable VL</th>
<th>In care with detectable VL</th>
<th>In care, no VL*</th>
<th>Diagnosed but not in care</th>
<th>Undiagnosed</th>
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<th>Community Viral Load</th>
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<th>In-Care Viral Load</th>
<th>In care with undetectable VL</th>
<th>In care with detectable VL</th>
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<th>Monitored Viral Load</th>
<th>In care with undetectable VL</th>
<th>In care with detectable VL</th>
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*No VL = missing/unknown viral load, for a variety of reasons (e.g., incomplete reporting) but do have some other type of lab result indicating ongoing medical monitoring.

**Not in care= no lab results of any type**

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<th>Strengths</th>
<th>Weaknesses</th>
<th>Comments</th>
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<td>Complete picture of HIV viral load within the area. Those with undiagnosed disease are likely to have a higher viral load and to be a source for ongoing transmission.</td>
<td>Viral load in those with undiagnosed HIV infection is not readily available.</td>
<td>Would require a special study including specimen collection.</td>
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<tr>
<td>The most complete population-level measure that is reasonably attainable.</td>
<td>Viral load data is missing for many diagnosed cases.</td>
<td>Need viral load results for &gt;75% of diagnosed individuals.</td>
</tr>
<tr>
<td>Easy to calculate. Readily identifies areas of incomplete reporting and/or people not receiving optimum monitoring.</td>
<td>Can not be used as a measure of the “infectiousness” of the population.</td>
<td>Need viral load results for &gt;75% of diagnosed individuals.</td>
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<tr>
<td>When compared to the in-care viral load over time, it can provide an indication of improvements to care and/or data capture.</td>
<td>Can not be used as a measure of the “infectiousness” of the population.</td>
<td></td>
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How Do These Measures Relate to Each Other Over Time?

- Population and community viral load are the only measures that are able to indicate how likely your group is to have ongoing HIV transmission.

- As the proportion of individuals with HIV who know they are infected increases, the community viral load approaches the population viral load.

- As the proportion of individuals who are diagnosed with HIV and are successfully linked to appropriate care, the monitored and in care viral loads will approach the community and population viral loads.

- In its most basic interpretation, you would eventually want all people with HIV to be in the in care with known viral load groups (2).
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Now That We Know Which Measures We Are Able to Calculate, How Do We?
Record Selection

- **Time frame**
  - Calculated for each calendar year
  - Allow for 12 months lag time to allow for reporting delays and to match cases to death records

- **Case inclusion criteria**
  - All residential cases
  - Alive at the end of the year in question

- **Lab selection**
  - Only use one result per person
  - Use the most recent viral load result, lab closest to December 31 of the corresponding year
Data Transformation

- How to handle undetectable viral loads
  - Enter a numeric value for those listed as “undetectable” based on the lower limit of detection for those assays
  - Best estimate is half of the lower limit of detection
- How do you account for people who are in-care but missing viral load results?
  - Data imputation
  - Use demographics from those with known viral loads to assign viral loads to those missing results
  - Can not be used for those not in-care because the viral load distributions would be fundamentally different
  - Recommended that you have <25% of people with missing viral loads
Sub-group Analysis

- What if you want to look at sub-groups compared to each other or to the state?
  - Geographic region (city, MSA, zip code, county, etc.)
  - Racial/ethnic groups
  - Gender
  - Risk category

- Data quality checks similar to the overall analysis to ensure that the data for sub-groups is complete.

- Need a large enough sample size in each sub-group to detect a difference between the groups
  - For example, to detect a three-fold difference in the mean viral load you would need at least 78 observations
Florida Data Sources

- eHARS
  - Surveillance data set
  - Detectable and undetectable viral loads for all previously reported cases
  - Electronic and hard copy labs

- ADAP
  - ADAP and waitlist enrollment requires a viral load test every six months

- CAREWare
  - Labs entered for clinical management
  - Incorporates HMS data and several other sources
Florida Limitations

- Not all lab results are uploaded/entered into eHARS
  - Paper labs currently being entered for 2011, estimated completion March 2012
  - Not all lab systems are reporting electronically

- ADAP and other data systems represent special populations
  - Known in-care and therefore should have lower viral loads
  - Meet special eligibility requirements
  - Excludes people with health insurance who may be receiving different care
Next Steps

- Monitor proportion of known cases with VL as more ELRs are incorporated
- Encourage data collaboration to ensure that all data is captured and available centrally
- Explore smaller level analysis
  - For sites that are interested:
    - Assess lab data completeness
    - Address must represent the patient’s location (not clinic or lab) and it must be a valid address
Questions?

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