Quantifying the HIV Care Cascade in Ontario: Challenges and Future Directions

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Background

- The HIV care cascade is a framework that depicts the degree to which people infected with HIV are diagnosed in a timely fashion, become engaged in HIV care, and ultimately are successfully treated with antiretrovirals (ART).
- Monitoring is now priority for most jurisdictions to identify gaps in care, and target and evaluate interventions to improve HIV testing, linkage to care and ART support.

Objective

- We used existing data or published findings to estimate the cascade of HIV care for Ontario, as standardly defined, to provide a starting point for future improvement.

Methods

- We identified existing data sources in Ontario that could inform four cascade indicators (diagnosed, linked to care, retained in care, undetectable viral load).
  - Two cascades were calculated, starting with i) 100% of people infected with HIV, and
  - ii) 100% of people diagnosed with HIV.
  - Each step was dependent on the previous step (e.g., estimate for step B = estimate for step A * reported value for step B).
  - Low and high estimates are reported, as under- and over-estimation of cascade metrics can occur.

Results

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Values (low, high)</th>
<th>Definition</th>
<th>Year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosed</td>
<td>65%</td>
<td>Modelled estimate of proportion diagnosed</td>
<td>2009</td>
<td>OHEMU</td>
</tr>
<tr>
<td></td>
<td>75%</td>
<td></td>
<td>2011</td>
<td>PHAC</td>
</tr>
<tr>
<td>Linked to Care</td>
<td>80%</td>
<td>Of diagnosed, first viral load within 3 months</td>
<td>2007/08</td>
<td>OHEMU</td>
</tr>
<tr>
<td></td>
<td>78%</td>
<td>Of diagnosed, first viral load within 12 months</td>
<td>2010/11</td>
<td>OHEMU</td>
</tr>
<tr>
<td>Retained in Care</td>
<td>82%</td>
<td>Of people/participants accessing VL testing</td>
<td>2007/08</td>
<td>OHEMU</td>
</tr>
<tr>
<td></td>
<td>85%</td>
<td>having ≥2 tests/year</td>
<td>2012</td>
<td>OCS</td>
</tr>
<tr>
<td>Undetectable viral load</td>
<td>63%</td>
<td>Undetectable</td>
<td>2007/08</td>
<td>OHEMU</td>
</tr>
<tr>
<td></td>
<td>73%</td>
<td>&lt;400 copies/mL</td>
<td>2012</td>
<td>OCS</td>
</tr>
</tbody>
</table>

Notes:

- OHEMU = Ontario HIV Epidemiologic Monitoring Unit, University of Toronto
- PHAC = Public Health Agency of Canada
- OCS = Ontario HIV Treatment Network Cohort Study

Conclusions

- Using existing information, populating the cascade for Ontario was possible. While our analysis was limited by relying on data from different years, we were able to provide a range of estimates for each step which may be a more valid way to present estimates.
- Estimates were comparable to other jurisdictions (e.g., British Columbia, USA), recognizing that jurisdictional metrics differ.
- Estimates are heavily dependent on assumptions regarding HIV incidence and the undiagnosed fraction, for which better estimates are needed.
- We agree with others that “…although intuitively appealing in practice, the cascade is difficult to estimate accurately.” Accuracy of estimates are affected by multiple factors, including: quality of identifying information needed to link diagnosis, viral load, treatment, and other data needed; under-reporting; in-migration counted as new cases; and unknown loss to follow-up.
- In addition, the standard presentation of the cascade of HIV care – presenting a linear, dependent series of steps – poses challenges by combining people newly diagnosed and with long-standing infection, and does not accurately capture the cyclical nature of HIV care, where individuals may engage/re-engage at various points in the cascade.
- Recommendations for improving the accuracy of cascade estimates include triangulation of data sources and generation of a range of estimates for each cascade stage, “rather than an artificially precise single numerical estimate.”

Next Steps

- Next steps:
  - Revised Ontario-based mathematical models and linked population-based data sources for empirical estimates
  - Adopting a theoretical framework reflecting the cyclical nature of HIV care
  - Continuing to generate a range of estimates through data triangulation
  - A priority of the new Ontario HIV strategy is to refine metrics which broaden the traditional HIV Care Cascade to include other forms of prevention, care, and engagement beyond ART (e.g., morbidity care), and to incorporate underlying determinants.