

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

Mark Gilbert<sup>1</sup>, Sandra Gardner<sup>1,3</sup>, James Murray<sup>2</sup>, Frank McGee<sup>2</sup>, Ann Burchell<sup>1,3</sup>.

1. Ontario HIV Treatment Network, 2. AIDS Bureau, Ontario Ministry of Health and Long-term Care, 3. Dalla Lana School of Public Health, University of Toronto.

## 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<sup>2,1</sup>

## Results

Indicator	Values (low, high)	Definition	Year	Source
Diagnosed	65%	Modelled estimate of proportion diagnosed	2009	OHEMU <sup>2</sup>
	75%		2011	PHAC <sup>3</sup>
Linked to Care	80%	Of diagnosed, first viral load within 3 months	2007/08	OHEMU <sup>4</sup>
	87%		2010/11	OHEMU <sup>5</sup>
Retained in Care	82%	Of people/participants accessing VL testing having ≥2 tests/year	2007/08	OHEMU <sup>4</sup>
	85%		2012	OCS <sup>6</sup>
Undetectable viral load	63%	undetectable	2007/08	OHEMU <sup>4</sup>
	73%		<40 copies/mL	2012

### Notes:

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

### References:

1. Sabharwal CJ, Braunstein SL, Robbins RS, Shepard CW. Optimizing the use of surveillance data for monitoring the care status of persons recently diagnosed with HIV in NYC. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*. 2014;65(5):571-8. 2. Remis RS, Swantee C, Liu J. Report on HIV/AIDS in Ontario 2009. Ontario HIV Epidemiologic Monitoring Unit, June 2012. 3. Chapter 1: National HIV Prevalence and Incidence Estimates for 2011. HIV/AIDS Epi Updates. Ottawa, Ontario, Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada. 4. Bayoumi, A., et al. (2011). HIV Infection. Project for an Ontario Women's Health Equity Report. Toronto. 5. Rank, C., et al. (2014). Timely Linkage to Care Following HIV Diagnosis in Ontario. 23rd Annual Canadian Conference on HIV/AIDS Research. St. Johns, Newfoundland. 6. Burchell AN, Gardner S, Light L, Ellis B, Antoniou T, Bacon J et al. Engagement in HIV care among persons enrolled in a clinical HIV cohort in Ontario, Canada, 2001-2011. *J Acquir Immune Defic Syndr* 2015; in press. 7. Miller WC, Lesko CR, Powers KA. The HIV care cascade: simple concept, complex realization. *Sexually transmitted diseases*. 2014;41(4):41-2. 8. Buskin SE, Kent JB, Dombrowski JC, Golden MR. Migration distorts surveillance estimates of engagement in care: results of public health investigations of persons who appear to be out of HIV care. *Sexually transmitted diseases*. 2014;41(1):35-40. 9. Krentz HB, MacDonald J, Gill MJ. The impact of transfer patients on the local cascade of HIV care continuum. *Journal of Acquired Immune Deficiency Syndromes: JAIDS*. 2015;68(2):236-40. 10. Hallett TB, Eaton JW. A side door into care cascade for HIV-infected patients? *Journal of Acquired Immune Deficiency Syndromes: JAIDS*. 2013;63 Suppl 2:S228-32.

## Results (continued)

Figure 1: Estimated Cascade for Ontario, starting with people infected with HIV.

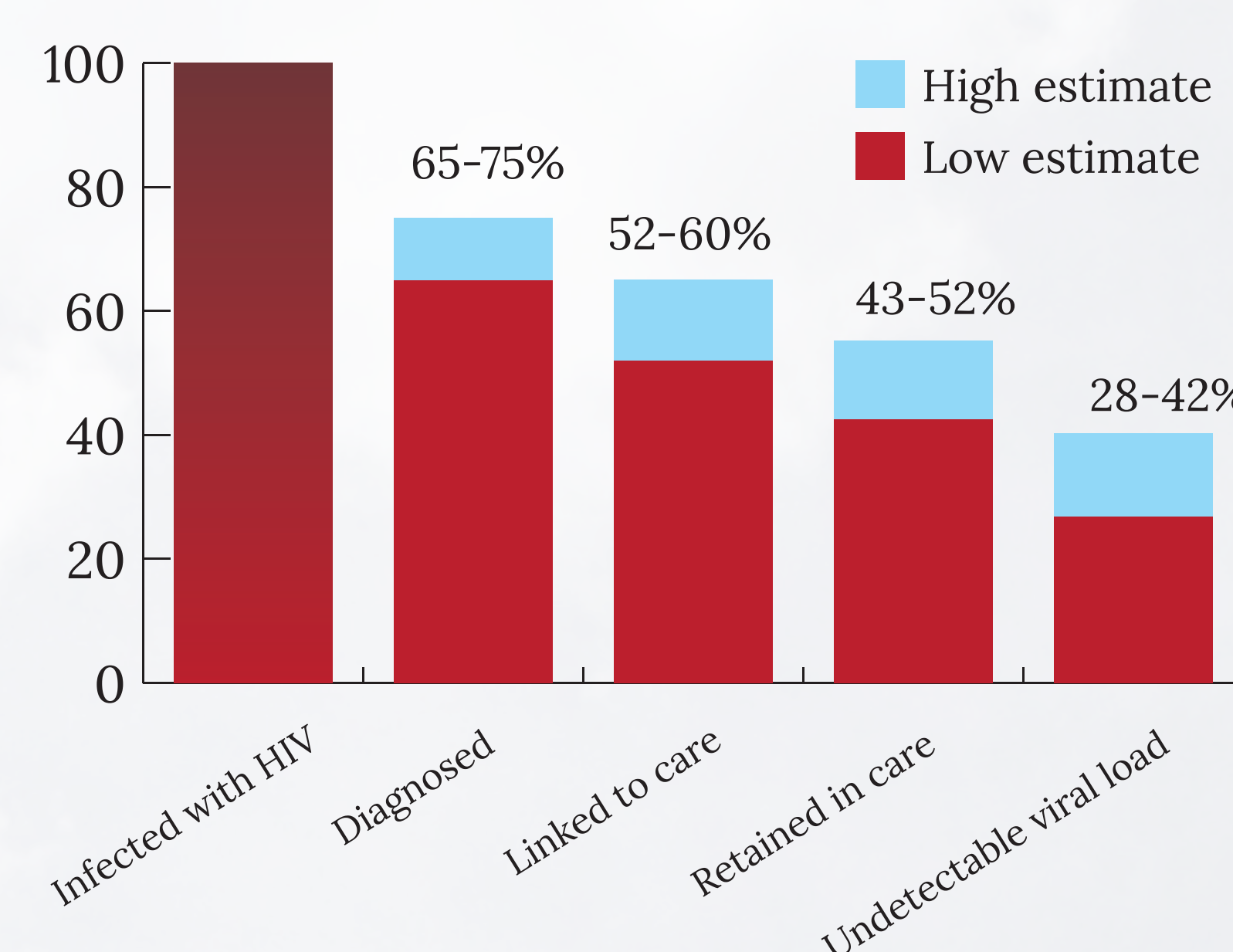
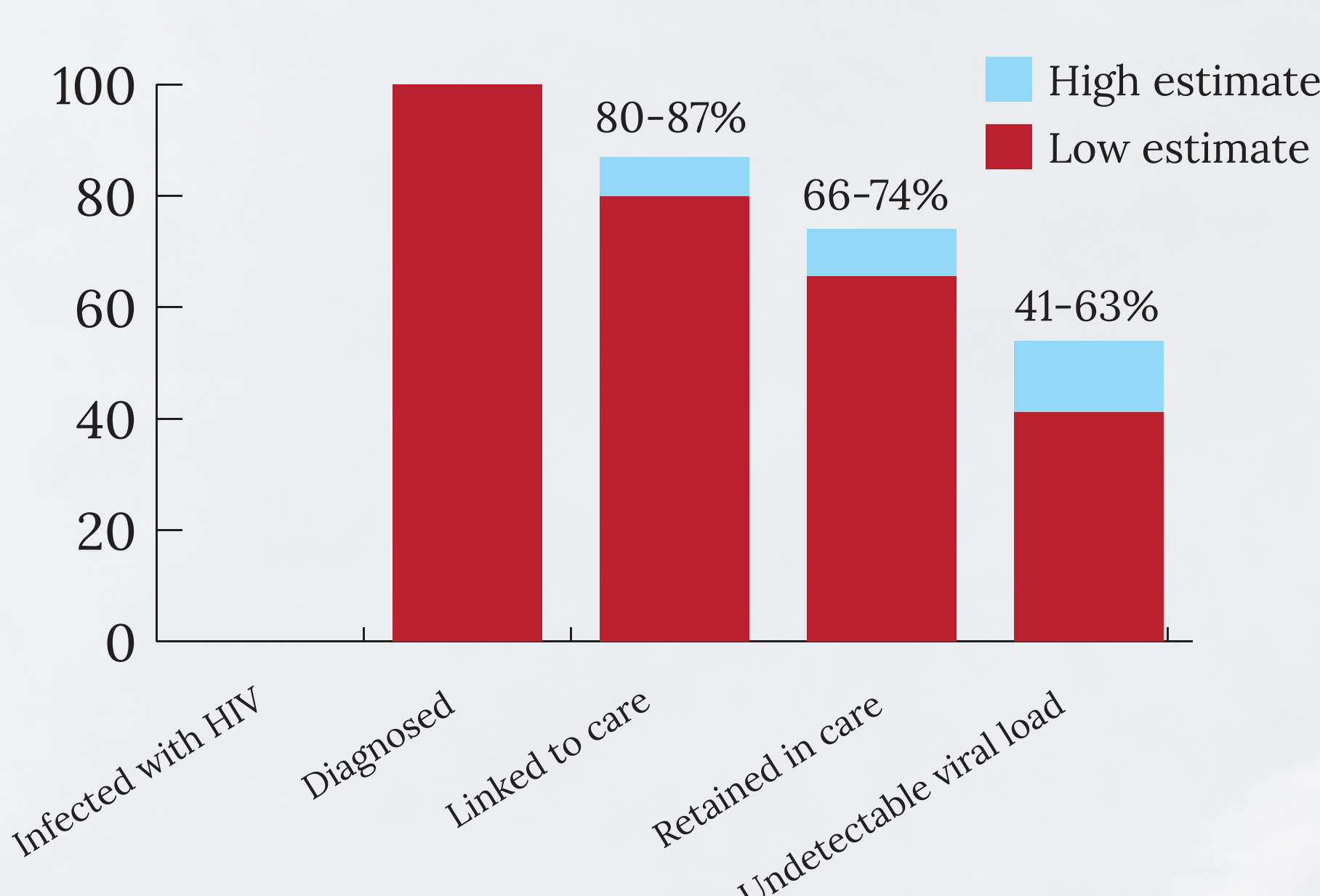


Figure 2: Estimated Cascade for Ontario, starting with people diagnosed with HIV.



## 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."<sup>7</sup> 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.<sup>1,8,9</sup>
- 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.<sup>10</sup>
- 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."<sup>1</sup>

## 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., co-morbidity care), and to incorporate underlying determinants.