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System Dynamics (SD) Model of the HIV Care Continuum V.3

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We use this protocol and it's working

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Disclaimer

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Abstract

This protocol describes the development, design, and calibration of a system dynamics (SD) model of the HIV Care Continuum (CC) in one geographic region. Community stakeholders can use this SD model to better understand structural and behavioral characteristics of the HIV CC system and to inform strategic planning to determine the most promising strategies to prevent new HIV infections while also improving care for those infected and affected. This SD model can be used to learn about the dynamics of an HIV CC system by using the "base case scenario" to simulate system results. Model users can also test different "hypotheses" or "what-if scenarios" to see which combination of resources and actions generate the best improvements to the system. The model also can potentially be recalibrated to simulate the HIV CC in other geographic regions.

To build this SD model, our research team collaborated with a coalition of 25 community stakeholders called the System Dynamics Modeling Task Force. This group included doctors, nurses, community clinic support staff, HIV/AIDS service organizations director, front line case managers and outreach workers, people living with HIV (PLWH), community advocates and activists, and representatives of the city and state departments of health. Using SD "group model building," we conducted 16 iterative systems modeling workshops over an 18-month period (Jan. 2017 – July 2018) to diagram, calibrate, and simulate the regional HIV CC system.

The computational model was designed using system dynamics graphical software Stella Architect1.9.4®. It was parameterized using primary and secondary data, related literature, and stakeholder best estimates. These include CT Department of Public Health HIV surveillance data for 2015-2017 and regional Ryan White health services data for the same period. The resulting "base case scenario" reproduces the epidemic in the initially selected catchment area, namely, the Hartford TGA (Transitional Grant Area), a HRSA-designated Ryan White (RW) funded area that includes Hartford, Middlesex, and Tolland Counties in Connecticut, USA. Model parameters (initial values) and equations were calibrated to simulate the base case scenario over a time horizon of 60 months (2018-2023). To demonstrate effective SD model performance, we compared base case simulated output for the prior calendar year (2017) with reported trends over the same period in the catchment area. The model was rigorously validated with tests for structural and behavioral continuity and sensitivity analysis of some key parameters that have no or limited certainty.

Nine "modules" make up the full HIV CC SD model. These include:
A. HIV Infection and Treatment as Prevention;
B. HIV Testing and Prevention Services;
C. Medical Care Services for PLWH;
D. Ryan White Case Management Services;
E. Housing, Substance Use Treatment, and Mental Health Services for PLWH;
F. Peer Outreach to Promote HIV Testing;
G. Peer Advocacy to Support PLWH;
H. Expanded HIV Testing and Comprehensive Sexual Health Screening in Primary Care;
I. Mobilizing Community Initiatives to Support PLWH.

The "Action Strategies" (Modules F-I) are designed to improve delivery and effectiveness of the "Basic Services" (Modules B-E). Similarly, the "Basic Services" are designed to improve the effectiveness of the central HIV

Infection and Treatment as Prevention (Module A) to reduce community-level viral load.

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Attachments

Table1 HIV CVL SDM v...
120KB

Table2 HIV CVL SDM v...
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Table3 HIV CVL SDM v...
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Table4 HIV CVL SDM v...
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Table5 HIV CVL SDM v...
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Table6 HIV CVL SDM v...
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Table7 HIV CVL SDM v...
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Table8 HIV CVL SDM v...
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Table9 HIV CVL SDM v...
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