TITLE: The Potential Impact of Ending the Ryan White HIV/AIDS Program on HIV Incidence: A Simulation Study in 31 US Cities

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### Abstract:

#### Background:

With antiretroviral therapy, people with HIV can live a normal lifespan and not transmit HIV. The Ryan White HIV/AIDS Program provides care for over half of people with HIV in the US.

#### Objective:

To estimate how many HIV infections could result from cessation of Ryan White services or interruptions lasting 18-42 months.

#### Design:

We used a compartmental HIV transmission model to simulate epidemics and Ryan White service use.

#### Data Sources:

We calibrated model transmission to CDC surveillance data in each city and calibrated the number of Ryan White clients to program reports. We surveyed Ryan White clinic directors and administrators to estimate how many clients would lose viral suppression if services stopped.

#### Target Population:

We simulated HIV epidemics in 31 high-burden US cities.

#### Intervention / Time Horizon:

We projected HIV incidence through 2030 under four scenarios: (a) continued services, (b) cessation in July 2025, (c) interruption until January 2027, and (d) interruption until January 2029.

#### Outcome Measures:

Projected excess HIV infections from 2025 to 2030.

#### Results of Base Case Analysis:

Ending Ryan White services in July 2025 could result in 75,436 additional infections through 2030 (95% credible interval: 19,251–134,175) - a 49% (25–70%) increase. Increases ranged from 9% (Riverside, CA) to 110% (Baltimore, MD). Interruptions of 18 and 42 months yielded 19% and 38% more infections.

#### Results of Sensitivity Analysis:

A “conservative” analysis with lower simulated loss of suppression from observational studies projected 34,051 excess infections (23,902–45,147).

#### Limitations:

The loss of suppression if Ryan White services end may be misestimated by survey responses and observational studies.

#### Conclusions:

Disrupting Ryan White services could sharply increase HIV incidence, highlighting their critical public health value.

#### Funding:

None.

### Introduction:

The Ryan White HIV/AIDS Program provides comprehensive HIV medical care, treatment, and support services for over half of the 1.2 million people living with HIV in the US.1 With antiretroviral therapy, people with HIV can expect to live a normal lifespan and do not transmit HIV.2,3,4 Ryan White often serves as a “payor of last resort” for those who would otherwise be unable to access care and is instrumental in helping clients to maintain viral suppression.

Most Ryan White services fall into one of three categories: (1) the AIDS Drug Assistance Program, where grants pay for antiretroviral therapy directly, pay premiums for health insurance, and help with medication copays; (2) direct funding to HIV care facilities for outpatient ambulatory health services; and (3) provision of non-medical support services, such as case management, transportation assistance, adherence support, and housing assistance5 (Figure S1).

Ryan White clients have higher viral suppression rates than people with HIV who do not receive Ryan White services.6 However, only one study has examined discontinuation of services: Erly, et al found that viral suppression dropped from 83% to 69% among Ryan White clients who were disenrolled from the AIDS drug assistance program in Washington state7; dropping from 82% to 64% among those who did not re-enroll within a year (unpublished results). Another study by Diepstra et al. examined suppression rates by service category (with no discontinuation) and found that people with HIV receiving Ryan White medical services had 1.5- to 2.9-fold greater odds of viral suppression than those without; clients receiving support services had 0.8 to 2.3 times the odds of suppression8.

Widespread disruptions to Ryan White services could have significant consequences. Mathematical models of disease transmission are an important tool for forecasting impacts of health policy. Prior studies have estimated that without Ryan White, new infections would increase by 16 to 22% in specific states over 5 years and 18% nationally over 50 years.9,10 However, the US HIV epidemic is driven by local dynamics, and simulations of large geographic regions may obscure local heterogeneity. We sought to use a city-level model of HIV transmission to quantify the number of excess HIV infections in US cities that would result from cessation or interruption of Ryan White services.

### Methods:

#### Model Structure:

The Johns Hopkins Epidemiologic and Economic Model (JHEEM) is a dynamic, compartmental model of HIV transmission. The model represents variable transmission across strata of the adult population by age, race/ethnicity, sex, and risk factors for HIV acquisition.11 Demographic groups are categorized by HIV infection status, awareness of HIV status, and use of pre-exposure prophylaxis (Supplemental Figure S1).

To represent the Ryan White program, we expanded each compartment of people with diagnosed HIV to include the proportion receiving Ryan White services in three non-overlapping categories: (a) any AIDS drug assistance, (b) outpatient ambulatory health services but not AIDS drug assistance, and (c) any other Ryan White services (Supplement Figure S2). We also modeled the proportion virally suppressed among Ryan White clients receiving each class of services in each compartment, such that decreases in suppression among clients would lead to greater transmission. We represented proportions using a logistic model with terms for time, age, race, sex, and HIV-acquisition risk factor.

#### Study Setting:

The JHEEM simulates HIV epidemics at the level of a metropolitan statistical area: geographic designations with a core city and its surrounding counties. The US Ending the HIV Epidemic initiative highlights 48 counties with high disease burden, which fall into 32 distinct metropolitan statistical areas.12 We excluded Cincinnati, for which city-level number of Ryan White clients are not reported, and studied the remaining 31 cities.

#### Model Calibration:

The calibration of JHEEM has been described previously11; we generate simulations for each city by running an Adaptive Metropolis Sampler for 1,000,000 iterations across four chains. We retain a sample of 1,000 simulations per city which match local epidemiological targets, including new diagnoses, prevalence, and overall viral suppression (Supplement Table S1).

We calibrated additional parameters representing receipt of Ryan White services and viral suppression among Ryan White clients, according to demographics and risk factors (see Supplement). For each simulation, we ran an Adaptive Metropolis Sampler for 300 to 3,000 additional iterations to calibrate Ryan White utilization from 2017-2023 as per Ryan White program reports (Supplement Table S2): (a) the number of clients receiving any non-AIDS drug assistance services, (b) the number of clients receiving outpatient ambulatory health services,13,14,15,16,17,18,19, (c) the rate of viral suppression among outpatient ambulatory health services recipients,13,14,15,16,17,18, (d) the ratio of AIDS drug assistance program clients to non-AIDS drug assistance program clients at the state level20,21,22, and (e) the proportion of AIDS drug assistance program clients at the state level who were virally suppressed23,24,25,26. Both our model and Ryan White reporting consider a “client” to be a person who has received services at any point during a calendar year.

#### Modeled Scenarios:

We represented the effect of stopping or interrupting Ryan White services as the proportion of currently suppressed Ryan White clients who lose suppression once services stop in each of the three service categories. We simulated four scenarios for each city. (1) “Continuation” - Ryan White services continue at current levels and viral suppression continues its current trajectory. (2) “Cessation” - Ryan White services stop in July 2025; viral suppression among Ryan White clients drops and never recovers. (3) “Brief Interruption” - Ryan White services stop in July 2025; suppression among Ryan White clients begins to improve in January 2027 and recovers to prior levels by December 2027. (4) “Prolonged Interruption” - Ryan White services stop in July 2025; suppression among Ryan White clients recovers from January 2029 to December 2029.

In all scenarios, we projected the HIV epidemic in each city to 2030. These projections continued current trends in transmission, suppression, testing, and PrEP uptake into the future, with randomly sampled variation11.

The proportion of Ryan White clients who would lose suppression because of widespread cessation of services is unknown. We developed a survey and distributed it to clinic directors, administrators, and health officials with expertise in Ryan White programs and asked respondents to estimate the likely proportion their clinics’ Ryan White clients who would lose suppression for each of the three service categories (details in Supplement). We also elicited estimates of the proportion of patients from rural areas and the states from which patients came (Supplement Figure S3). The survey was distributed through mailing lists of HIV and Ryan White providers (the Ryan White Medical Providers Coalition and the HIV Medical Association), message boards for the Infectious Diseases Society of America, and investigators’ professional networks.

We based our primary analysis on these survey results, fitting one multivariate kernel density to arcsine-transformed survey responses using the ks package27 for respondents from Medicaid non-expansion states and a second kernel density for expansion state respondents. From these distributions, we simulated 1,000 different values of the proportion of suppressed Ryan White clients who would lose suppression in each of the three service categories, conditional on Medicaid expansion status, and applied these proportions to the 1,000 simulations in each of the 31 cities.

#### Outcomes:

Our primary outcome was the relative projected excess incident HIV infections from 2025 to 2030 that would be incurred by either cessation or interruption of Ryan White services vs. continuation:

We calculated the absolute number of excess infections from 2025 to 2030 as a secondary outcome. For both outcomes, we calculated the mean across 1,000 simulations and the 95% credible interval (2.5th and 97.5th percentiles) – for each city and for the total across all 31 cities.

#### Secondary Analyses:

Because survey respondents may overestimate the impacts of Ryan White disruptions, we conducted a secondary analysis that incorporated two studies on the impacts of Ryan White on viral suppression. In this analysis, we treated the survey results as a prior distribution and conditioned on Erly et al.’s estimate of suppression loss from AIDS Drug Assistance Program disenrollment,7 and Diepstra et al.’s associations between viral suppression and Ryan White outpatient medical or support services.8 We sampled the effects on viral suppression from this posterior distribution – which substantially reduced simulated losses in suppression (see Supplement for details).

We also conducted a secondary analysis to examine the primary determinants of between-city variation. For each city, we calculated the average (across simulations) relative excess infections from 2025-2030, and evaluated this against five baseline variables in 2025: (a) the proportion of people with HIV receiving Ryan White services, (b) rates of suppression and (c) sexual transmission, (d) number of new diagnoses, and (e) whether the city falls principally in a Medicaid expansion state. We calculated partial rank correlation coefficients for each variable and made scatterplots of variables against relative excess cases.28

#### Sensitivity Analyses:

We conducted probabilistic sensitivity analyses to identify influential parameters.28 We calculated partial rank correlation coefficients for (a) parameters governing the proportion of people with HIV who receive Ryan White services, (b) parameters governing the proportion of Ryan White clients who are virally suppressed, and (c) proportions of Ryan White clients in each service category who would lose suppression if services end. We visualized the impact of highly influential parameters by ranking the simulations in each city by parameter value and comparing the outcome from the 20% of simulations with the highest values of that parameter to the 20% with the lowest.

#### Web Tool:

We present all results and customizable scenarios via a public web tool at www.jheem.org/ryan-white.

### Results:

#### Survey of Ryan White Clinic Directors, Administrators, and Health Officials

One hundred eighty Ryan White clinic directors, administrators, and health officials completed our survey; 135 cared for patients from 33 Medicaid expansion states plus Washington DC and 54 cared for patients from 8 Medicaid non-expansion states (Supplement Figure S4). The median reported proportion of clients from rural areas was 20%.

Expected losses in suppression varied widely among respondents, ranging from 0% to 100% in all service categories (Figure 1). On average, respondents expected 65% losses in suppression (interquartile range 40-90%) among recipients of AIDS drug assistance, 49% (25-70%) among outpatient ambulatory health services recipients NOT receiving AIDS drug assistance, and 37% (10-60%) among Ryan White clients receiving other services. Expected losses were significantly greater among respondents from Medicaid non-expansion states (for AIDS Drug Assistance clients), and among respondents with ≥50% rural patients (for AIDS Drug Assistance and outpatient ambulatory health services). Results did not differ significantly by geographic region (Supplement Table S3). Respondents who did not complete the survey estimated greater losses in suppression on the questions they did answer than respondents who completed the survey (Supplement Figure S5 and Table S4).

The sampled effects on viral suppression in our “conservative” analysis which incorporated data from two studies were substantially lower that the effects sampled directly from smoothed survey responses (Figure 1).

#### Overall Impact of Ryan White Program Cessation or Interruption

Our simulations closely matched the proportions of city residents who were receiving Ryan White services and the proportions of Ryan White clients who were virally suppressed (see Supplemental Figure S5 for Houston, TX as an example and www.jheem.org/ryan-white for the other cities).

If Ryan White programs continue uninterrupted, we project 154,429 incident HIV infections from 2025 through 2030 (95% credible interval 147,165 to 161,767) across all 31 cities (See Figure 2 for Houston, TX and Figure 3 for all 31 cities).

In our primary analysis, following a halt to Ryan White services in July 2025, average viral suppression across all cities was projected to drop from 74% in 2025 (72 to 75%) to 49% in 2026 (27 to 68%). If viral suppression among Ryan White clients never recovers (“Cessation”), we project 75,436 additional infections (19,251 to 134,175) across all 31 cities from 2025 to 2030, an excess of 49% (12 to 86%).

There was wide variation across cities, ranging from 9% (1 to 23%) excess infections in Riverside, CA to 110% (21 to 229%) in Baltimore, MD (Figures 3 and 4). The projected increase in infections differed by Medicaid expansion status, with the 10 cities in non-expansion states projected to experience 54% more infections (16 to 85%) vs. 45% (9 to 89%) in the 21 cities in expansion states.

In the “Brief Interruption” scenario, where Ryan White services cease in July 2025, but viral suppression recovers gradually from January through December 2027, we project 28,999 (7,507 to 51,820) additional infections from 2025 to 2030 – an excess of 19% (5 to 33%).In the “Prolonged Interruption” scenario, where Ryan White services cease in July 2025, but viral suppression does not recover until January through December 2029, we project 57,933 incident infections (14,995 to 102,827) through 2030 – an excess of 38% (10 to 66%).

Under the Cessation scenario, increased infections will occur principally among adults under 25 years old: a 65% increase (17 to 113%) from 2025 to 2030 as compared to 45% (12 to 79%) among those over 25 years old. Infections will also rise more among men who have sex with men than other risk groups: 57% (14 to 100%) vs. 35% (9 to 63%) for all other risk groups combined. We did not find large differences in excess infections by race: 47% (13 to 83%) for Black city residents, 50% (12 to 89%) for Hispanic residents, and 49% (12 to 91%) for non-Black, non-Hispanic residents.

#### “Conservative” Secondary Analysis

In the “Conservative” secondary analysis which informed the potential impact of Ryan White disruptions with two observational studies of Ryan White clients, the model projected a shallower drop in viral suppression from 76% in 2025 to 63% (59-67%) in 2026. Permanent cessation of Ryan White services resulted in 34,051 excess infections (23,902 to 45,147), a 22% (15 to 29%) increase – ranging from 4% (2 to 8%) in Riverside, CA to 55% (34 to 80%) in Baltimore, MD.

Results for the other two scenarios were similarly attenuated. The “Brief Interruption” scenario projected 13,166 excess infections (9,290 to 17,439), an increase of 9% (6 to 11%). The “Prolonged Interruption” scenario projected 26,336 additional infections (18,477 to 34,908), an excess of 17% (12 to 23%).

#### Secondary Analysis of Between-City Variation

The two most influential variables in explaining between-city variation were (a) the proportion of people with HIV receiving any Ryan White services in 2025 (partial rank correlation coefficient 0.70) and (b) viral suppression among all diagnosed people with HIV (0.31). Figures 5 and S9 illustrate the relationship between these variables and the excess infections incurred by ending Ryan White programs.

#### Sensitivity Analyses

In our sensitivity analyses, the most influential parameters were those describing the effects of service cessation for Ryan White clients receiving AIDS Drug Assistance, outpatient health services, and other support services. (Supplement Figures S6 and S7).

### Discussion:

We used a mathematical model, informed by survey, CDC, and Ryan White program data, to estimate the impact of disruptions of the Ryan White HIV/AIDS Program in 31 US cities. Across all cities, we project that indefinite cessation of Ryan White services will cause an excess 75,436 infections from 2025 to 2030 (95% credible interval 19,251 to 134,175), an increase of 49% (12 to 86%). Temporary interruptions to Ryan White services would also result in substantial rises in new HIV infections: a 19% increase (5 to 33%) if viral suppression among Ryan White clients begins to recover in January 2027, and a 38% increase (10 to 66%) if viral suppression does not start to recover until January 2029. Projected increases in infections varied widely between cities, ranging from 9% in Riverside, CA to 110% in Baltimore, MD.

Differences between cities were driven by how many people receive Ryan White services in each city, whether Medicaid has been expanded, and the baseline level of viral suppression. These findings align with prior studies demonstrating that gaps in antiretroviral therapy access led to increased community viral load and transmission4,6,11. Even short-term lapses in services could have long-term consequences for epidemic control.

Our projections depend on how many Ryan White clients would lose suppression if services end. Fundamentally, this quantity is unknown; there has never been a widespread halt to Ryan White services. In our primary analysis, we estimated the proportion of clients who would lose suppression by surveying clinic directors, administrators, and public health officials with expertise in Ryan White programs. Respondents’ estimates varied widely, reflecting uncertainty about potential impacts of unprecedented, large-scale disruptions to Ryan White programs. Our model incorporated this uncertainty: across the 1,000 simulations in each city, some assumed almost no effect from Ryan White cessation, while others assumed nearly 100% losses of viral suppression for clients in some service categories. This variation was reflected in wide credible intervals.

It is possible that survey respondents, on average, overestimated the impacts of Ryan White disruptions. We conducted a “conservative” secondary analysis, in which simulated impacts of Ryan White cessation were weighted heavily to two observational studies: Erly et. al recorded a 22% drop in viral suppression among AIDS Drug Assistance clients who were disenrolled for a year7, and Diepstra et. al, observed up to 2.9-fold greater odds of suppression among participants receiving Ryan White’s outpatient medical or support services8. These simulations, assuming a lower decrease in suppression, projected an average 22% increase in infections. However, the observational studies underpinning this analysis likely underestimate the causal effect of Ryan White programs; clients who do not re-enroll in Ryan White may be less dependent on services than those who re-enroll promptly, and clients receiving Ryan White services might have had lower suppression rates without those services than patients who were not eligible in the first place. Furthermore, observations of individuals in existing programs are unlikely to accurately characterize the consequences of comprehensive cessation of services. Consequently, our conservative analysis likely substantially understates the impact of Ryan White disruptions.

Two prior studies have estimated infections averted by Ryan White: Goyal, et al used an agent-based model to project national trends,9 and Klein et. al. modeled representative “high-prevalence” and “low-prevalence” states.10 Both studies projected 25 percentage-point decreased in overall suppression, matching the average 25-point decrease in our primary analysis (and exceeding the 13-point drop in our conservative analysis). However, Goyal et al. projected 18% more infections over 50 years, and Klein et al. projected 16% and 22% increases over five years, vs. 49% over five years in our primary analysis. These differences likely stem from how the analyses model transmission. Klein et al. calculate excess infections as the number of people who lose suppression multiplied by a pre-estimated transmission rate. In contrast, we model transmission dynamically: newly infected individuals infect others, who in turn infect others, and so on – such that infections from Ryan White disruptions compound over time. Goyal et al., who do model transmission dynamically, simulate the national environment, which has a lower average transmission rate and a smaller proportion of Ryan White clients than the 31 high-burden cities we studied. Additionally, over 50 years, Goyal et al. project a 31% rise in deaths among people with HIV (foreclosing further transmission from those individuals and exceeding additional infections), whereas we project a lower 15% increase in mortality over five years.

As with any modeling study, our analysis has certain limitations. First, we do not consider effects on morbidity or quality of life for people currently living with HIV, which will likely worsen substantially for many Ryan White clients if services are terminated; nor do we perform a cost-effectiveness analysis. Second, we assume that cessation of Ryan White services will affect only Ryan White clients; in reality, a sudden cut to clinic funding is likely to have spill-over effects on non-Ryan White clients living with HIV. Third, in interruption scenarios, we presume that all clients would regain suppression within a year of programs restarting; it Is likely some individuals would experience long-term loss to care. Fourth, we assume that there are no concurrent major changes to insurance coverage or HIV prevention efforts. Last, we focus only on 31 cities. While 60% of US infections are diagnosed within these cities, these urban centers may not reflect dynamics in other parts of the country; future work should examine potential impacts at the state level and in rural areas.

Our approach has several strengths. First, we model HIV epidemics at the resolution of individual cities, allowing us to capture local dynamics. Second, our Bayesian calibration process robustly characterizes uncertainty about future epidemic trajectories. Finally, local decision makers can consider forecasts, available in detail at www.jheem.org/ryan-white, for their cities to inform HIV epidemic control planning.

In summary, using a city-level model of HIV transmission in the US, we estimated that even brief disruptions in the Ryan White HIV/AIDS Program could lead to 30,040 excess HIV infections in 31 US cities by 2030. Full cessation of the program would be even more detrimental, generating an estimated 75,436 excess infections. Similar to the US HIV epidemic itself, the effects are unevenly distributed across cities, with those cities more reliant on Ryan White services and cities in Medicaid non-expansion states experiencing more severe impacts. These findings illustrate the value of Ryan White programs in preventing the spread of HIV in the US and illustrate the implications of even brief interruptions in Ryan White services at the municipal level.

### Acknowledgments

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**Figure 1: Loss of Viral Suppression from Survey of 180 Ryan White Clinic Directors, Administrators, and Health Officials and Sampled Suppression Effects**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **AIDS Drug Assistance**  **Program Recipients** | **Outpatient Health Services**  **Clients not Receiving**  **AIDS Drug Assistance** | **Ryan White Clients not Receiving AIDS Drug Assistance or Outpatient Health Services** |
| **Survey Results\*** | A graph with different colored bars  AI-generated content may be incorrect. | A graph with different colored bars  AI-generated content may be incorrect. | A graph with numbers and a bar chart  AI-generated content may be incorrect. |
| **61% [30–90%], n=127**  **73% [51–100%], n=50** | **47% [20–70%], n=107**  **54% [30–78%], n=46** | **36% [10–50%], n=105**  **42% [15–75%], n=43** |
| **Primary Analysis** | A graph with numbers and lines  AI-generated content may be incorrect. | A graph with numbers and lines  AI-generated content may be incorrect. | A graph with numbers and lines  AI-generated content may be incorrect. |
| **56% [28–85%], n=1,000**  **71% [52–96%], n=1,000** | **45% [19–67%], n=1,000**  **54% [31–77%], n=1,000** | **35% [10–54%], n=1,000**  **42% [11–75%], n=1,000** |
| **"Conservative" Analysis** | A graph with a number of numbers  AI-generated content may be incorrect. | A graph with numbers and a bar graph  AI-generated content may be incorrect. | A graph with numbers and a bar graph  AI-generated content may be incorrect. |
| **27% [22–31%], n=1,000**  **28% [22–33%], n=1,000** | **23% [19–27%], n=1,000**  **24% [20–28%], n=1,000** | **13% [11–16%], n=1,000**  **13% [10–16%], n=1,000** |
|  | **Proportion of Clients Who Would Lose Viral Suppression**    A close-up of a number of states  AI-generated content may be incorrect. | | |

Histograms of 180 survey responses (top row) plus the 1,000 suppression reductions sampled from a kernel density for the primary analysis (middle row) and the “conservative” analysis (bottom row), shaded by Medicaid Expansion status. The y-axis gives the count of respondents or samples, the x-axis gives the estimated proportion of Ryan White clients who would lose viral suppression if services end. Captions under each panel give the mean and interquartile range. Respondents had the option of replying “I don’t know” so individual questions have less than 180 responses.

**Figure 2: Projected HIV Incidence if Ryan White Programs End or are Interrupted**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Cessation** | **Prolonged Interruption** | **Brief Interruption** |
| Houston, TX | A graph showing the spread of infection  AI-generated content may be incorrect. | A graph with a line graph and text  AI-generated content may be incorrect. | A graph with blue and green lines  AI-generated content may be incorrect. |
| Four Cities  in Texas | A graph with a red line and blue line  AI-generated content may be incorrect. | A graph with a line and a line graph  AI-generated content may be incorrect. | A graph with a line graph and numbers  AI-generated content may be incorrect. |
| 10 Medicaid Non-Expansion Cities | A graph with a line graph and numbers  AI-generated content may be incorrect. | A graph with a line graph and numbers  AI-generated content may be incorrect. | A graph with a line graph and text  AI-generated content may be incorrect. |
| 21 Medicaid Expansion Cities | A graph with a line and a red line  AI-generated content may be incorrect. | A graph with a line and a red line  AI-generated content may be incorrect. | A graph with a line graph and numbers  AI-generated content may be incorrect. |
| 31 "Ending the HIV Epidemic" Cities | A graph with a line and a red line  AI-generated content may be incorrect. | A graph with a line graph and numbers  AI-generated content may be incorrect. | A graph with a line graph and numbers  AI-generated content may be incorrect. |
|  | A close-up of a graph  AI-generated content may be incorrect. | | |

Sample projections for Houston, four cities in Texas (Austin, Dallas/Forth Worth, Houston, and San Antonio), and totals across cities. Y-axes give the projected number of infections. Lines denote the mean across 1,000 simulations; ribbons give the 95% credible interval. Blue represents uninterrupted “Continuation” of Ryan White Services. In the other scenarios, Ryan White services stop in July 2025. In the “Cessation” scenario (red), viral suppression among Ryan White clients never recovers. In “Prolonged Interruption” (orange), viral suppression recovers from January to December 2029. In “Brief Interruption” (green), viral suppression recovers from January to December 2027.

**Figure 3: City-Level Excess HIV Infections from 2025-2030 If Ryan White Programs are Stopped or Interrupted**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Continuation** | **Cessation** | | **Prolonged Interruption** | | **Brief Interruption** | |
| **City** | Number of  Incident Infections | Number of Excess Infections | Relative Excess Infections\* | Number of Excess Infections | Relative Excess Infections\* | Number of Excess Infections | Relative Excess Infections\* |
| Baltimore, MD | 1,579 | 1,720 | 110% | 1,331 | 85% | 668 | 43% |
| [1,257-1,965] | [343-3,429] | [21-229%] | [264-2,654] | [17-174%] | [131-1,352] | [8-86%] |
| New Orleans, LA | 1,162 | 1,045 | 91% | 787 | 68% | 392 | 34% |
| [940-1,452] | [193-2,156] | [17-193%] | [145-1,616] | [13-145%] | [72-808] | [6-73%] |
| Boston, MA | 2,961 | 2,309 | 79% | 1,743 | 59% | 851 | 29% |
| [2,466-3,685] | [441-4,688] | [15-160%] | [343-3,514] | [11-120%] | [170-1,699] | [6-58%] |
| Seattle, WA | 3,014 | 2,320 | 78% | 1,752 | 59% | 839 | 28% |
| [2,458-3,810] | [450-4,789] | [14-162%] | [344-3,584] | [11-120%] | [165-1,713] | [5-57%] |
| Miami/Fort Lauderdale, FL | 9,171 | 6,983 | 77% | 5,468 | 60% | 2,810 | 31% |
| [7,367-11,116] | [2,121-12,226] | [23-130%] | [1,676-9,548] | [18-101%] | [861-4,944] | [9-51%] |
| Houston, TX | 9,211 | 6,623 | 72% | 4,907 | 54% | 2,363 | 26% |
| [7,648-10,904] | [1,905-11,026] | [20-125%] | [1,420-8,103] | [15-92%] | [680-3,887] | [7-44%] |
| Austin, TX | 1,878 | 1,301 | 70% | 983 | 53% | 480 | 26% |
| [1,544-2,296] | [355-2,193] | [19-121%] | [275-1,644] | [14-91%] | [136-795] | [7-44%] |
| Chicago, IL | 6,139 | 4,003 | 66% | 3,084 | 50% | 1,569 | 26% |
| [5,273-7,122] | [744-7,677] | [12-128%] | [581-5,901] | [9-99%] | [296-3,013] | [5-51%] |
| New York, NY | 14,232 | 8,380 | 60% | 6,526 | 47% | 3,367 | 24% |
| [11,110-20,471] | [1,570-17,086] | [12-128%] | [1,192-13,346] | [9-97%] | [610-7,111] | [5-50%] |
| Philadelphia, PA | 5,743 | 3,338 | 59% | 2,560 | 46% | 1,273 | 23% |
| [4,405-7,391] | [575-6,821] | [10-124%] | [438-5,207] | [8-95%] | [216-2,586] | [4-47%] |
| Dallas/Fort  Worth, TX | 11,414 | 6,727 | 59% | 5,041 | 44% | 2,439 | 21% |
| [9,403-13,295] | [2,037-10,933] | [18-96%] | [1,535-8,118] | [13-72%] | [738-3,928] | [6-35%] |
| Columbus, OH | 2,203 | 1,161 | 54% | 911 | 42% | 466 | 22% |
| [1,706-2,807] | [222-2,289] | [10-115%] | [179-1,774] | [8-88%] | [92-913] | [4-44%] |
| Indianapolis, IN | 2,106 | 1,105 | 53% | 857 | 41% | 432 | 21% |
| [1,769-2,522] | [223-2,214] | [10-108%] | [172-1,694] | [8-82%] | [85-848] | [4-41%] |
| Baton Rouge, LA | 982 | 488 | 50% | 357 | 37% | 169 | 18% |
| [796-1,219] | [100-994] | [9-106%] | [70-734] | [7-79%] | [31-361] | [3-39%] |
| Memphis, TN | 1,871 | 883 | 48% | 675 | 36% | 338 | 18% |
| [1,547-2,289] | [287-1,421] | [15-81%] | [219-1,090] | [11-62%] | [104-557] | [6-32%] |
| San Antonio, TX | 2,781 | 1,308 | 47% | 1,010 | 36% | 507 | 18% |
| [2,204-3,410] | [364-2,307] | [13-84%] | [286-1,771] | [10-63%] | [145-867] | [5-31%] |
| Charlotte, NC | 3,452 | 1,565 | 46% | 1,204 | 35% | 603 | 18% |
| [2,733-4,045] | [275-3,137] | [8-92%] | [214-2,383] | [7-70%] | [107-1,174] | [3-34%] |
| San Francisco, CA | 3,107 | 1,388 | 45% | 1,066 | 34% | 519 | 17% |
| [2,420-3,901] | [268-2,919] | [9-91%] | [211-2,247] | [7-69%] | [104-1,100] | [3-34%] |
| Tampa, FL | 4,474 | 1,940 | 44% | 1,513 | 34% | 781 | 18% |
| [3,482-5,303] | [576-3,373] | [13-77%] | [457-2,604] | [10-60%] | [232-1,357] | [5-31%] |
| Atlanta, GA | 14,608 | 6,056 | 42% | 4,639 | 32% | 2,323 | 16% |
| [12,199-16,871] | [1,682-10,541] | [11-77%] | [1,306-8,035] | [9-59%] | [651-4,086] | [4-29%] |
| Detroit, MI | 2,334 | 899 | 39% | 689 | 30% | 336 | 15% |
| [1,880-3,016] | [158-1,938] | [7-89%] | [120-1,470] | [5-68%] | [57-739] | [2-34%] |
| Phoenix, AZ | 4,678 | 1,771 | 38% | 1,367 | 30% | 686 | 15% |
| [3,948-5,600] | [341-3,641] | [7-81%] | [268-2,780] | [6-62%] | [137-1,391] | [3-31%] |
| Jacksonville, FL | 3,167 | 1,178 | 37% | 846 | 27% | 362 | 11% |
| [2,618-3,578] | [364-2,021] | [12-63%] | [261-1,463] | [8-46%] | [105-637] | [3-20%] |
| Washington, DC | 4,743 | 1,696 | 36% | 1,322 | 28% | 645 | 14% |
| [3,737-5,810] | [281-3,647] | [6-77%] | [220-2,848] | [5-59%] | [108-1,385] | [2-29%] |
| San Diego, CA | 3,605 | 1,294 | 36% | 996 | 28% | 496 | 14% |
| [2,884-4,376] | [239-2,537] | [7-71%] | [186-1,986] | [5-54%] | [90-1,012] | [3-27%] |
| Sacramento, CA | 2,425 | 852 | 35% | 667 | 28% | 337 | 14% |
| [1,900-2,894] | [147-1,750] | [6-74%] | [116-1,361] | [5-57%] | [58-693] | [2-29%] |
| Cleveland, OH | 1,999 | 631 | 35% | 486 | 27% | 236 | 14% |
| [1,120-3,466] | [133-1,323] | [6-92%] | [103-1,000] | [4-72%] | [45-516] | [2-37%] |
| Los Angeles, CA | 10,241 | 3,372 | 33% | 2,680 | 26% | 1,411 | 14% |
| [8,929-12,439] | [597-7,038] | [6-68%] | [469-5,610] | [4-54%] | [246-3,002] | [2-28%] |
| Orlando, FL | 6,163 | 1,693 | 28% | 1,339 | 22% | 701 | 11% |
| [4,828-7,417] | [500-2,906] | [8-47%] | [393-2,293] | [6-37%] | [202-1,196] | [3-19%] |
| Las Vegas, NV | 5,239 | 774 | 15% | 618 | 12% | 326 | 6% |
| [4,345-6,202] | [139-1,538] | [2-31%] | [112-1,234] | [2-25%] | [58-656] | [1-13%] |
| Riverside, CA | 7,747 | 633 | 9% | 509 | 7% | 273 | 4% |
| [5,056-10,073] | [111-1,384] | [1-23%] | [88-1,118] | [1-18%] | [48-596] | [1-10%] |
| **Medicaid Expansion Cities** | 89,690 | 40,745 | 45% | 31,511 | 35% | 15,894 | 18% |
| [83,648-95,859] | [8,033-79,786] | [9-89%] | [6,320-61,449] | [7-68%] | [3,183-31,174] | [4-35%] |
| **Medicaid Non-Expansion Cities** | 64,739 | 34,691 | 54% | 26,422 | 41% | 13,105 | 20% |
| [61,248-67,872] | [10,513-55,822] | [16-85%] | [8,093-42,454] | [12-65%] | [3,970-21,164] | [6-32%] |
| **Total** | 154,429 | 75,436 | 49% | 57,933 | 38% | 28,999 | 19% |
| [147,165-161,767] | [19,251-134,175] | [12-86%] | [14,995-102,827] | [10-66%] | [7,507-51,820] | [5-33%] |
|  |  | |  |  |  | | --- | --- | --- | | 0% | A yellow and orange rectangular object  AI-generated content may be incorrect. | 100% | | | | | | |

The “Continuation” column gives the mean and 95% credible interval, across 1,000 simulations, projected incident HIV infections from 2025-2030 if Ryan White programs continue uninterrupted. The columns labeled “Number of Excess Infections” give the mean and 95% interval of the absolute number of excess HIV infections expected from 2025-2030 under three scenarios where Ryan White programs are stopped in July 2025: “Cessation” (viral suppression among Ryan White clients never recovers), “Prolonged Interruption” (viral suppression recovers from January to December 2029), and “Brief Interruption” (viral suppression recovers from January to December 2027). The columns labeled “Relative Excess Infections” give the percent change in projected incident infections, relative to “Continuation”. Cells are shaded according to the relative excess infections. Cities in Medicaid non-expansion states are denoted by orange labels, those in expansion states by purple labels.

**Figure 4: City-Level Relative Excess HIV Infections from 2025-2030 If Ryan White Programs are Stopped or Interrupted**

A screenshot of a graph

AI-generated content may be incorrect.

Boxplots display the projected percentage increase in new infections under three scenarios in which all Ryan White services stop in July 2025: “Cessation” (red) – viral suppression among Ryan White clients never recovers; “Prolonged Interruption” (orange) – viral suppression among Ryan White clients recovers from January to December 2029; “Brief Interruption” (green) – viral suppression among Ryan White clients recovers from January to December 2027. The value along the x-axis represents the relative increase in cases vs. a scenario where Ryan White services continue uninterrupted. The dark vertical lines indicate the median projection across 1,000 simulations, the boxes indicate interquartile ranges (IQR), and whiskers cover the 95% credible interval. Cities in Medicaid non-expansion states are denoted by orange labels, those in expansion states by purple labels. \*The credible interval has been truncated at 160%.

**Figure 5: City-Level Variation in the Projected Relative Increase in HIV Infections if Ryan White Programs End in July 2025**

|  |  |
| --- | --- |
| A graph with different colored dots  AI-generated content may be incorrect. | A graph with numbers and dots  AI-generated content may be incorrect. |
| A graph showing the number of states  AI-generated content may be incorrect. | |

Each circle represents one city. The y-axis represents the average relative increase in projected HIV infections from 2025 to 2030 if Ryan White programs end in July 2025 vs. if they continue, averaged across 1,000 simulations. The x-axis represents the average proportion of people with HIV who are Ryan White clients in 2024 (Panel A) or average viral suppression among all people with HIV in 2024 (Panel B). The size of the circle is proportional to the number of projected new diagnoses in 2024. Cyan shading indicates that the city falls principally in a Medicaid expansion state; purple circles indicate that the city falls principally in a non-expansion state. PRCC = Partial Rank Correlation Coefficient, a measure of the strength of the association between the variable and the outcome.

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