How Should We Prioritize and Monitor Interventions to End the HIV Epidemic in America?

#1096

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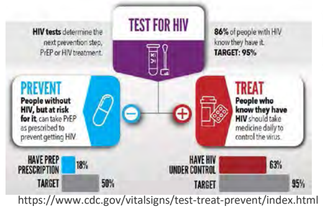
Background

The US Government's plan to reduce HIV transmission in the US

Ending the HIV Epidemic: A Plan for America **seeks to reduce new HIV infections by 90% by 2030**





https://www.cdc.gov/vitalsigns/test-treat-prevent/index.html

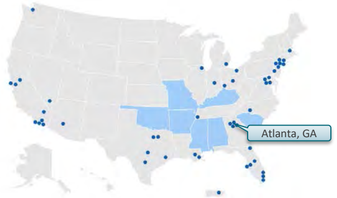
CDC recently announced ambitious targets for key measures related to HIV detection, prevention and control.

- In addition to these National targets, it will be important for local jurisdictions to monitor changes in their local epidemic to ensure progress

Methods

In this analysis we modeled a sexual network of 10,000 men who have sex with men (MSM) to assess what potential changes in key markers would be expected as interventions are scaled up

- Details of the mathematical model are presented on poster #1126
- We describe the impact of the interventions, including increasing HIV screening combined with the offer of PrEP, and improvements in HIV care retention, on process measures that would be routinely available to health departments to help them monitor their progress towards control of HIV transmission







In addition to measures of the proportion of all people living with HIV who know they have it, we explore the effects of these interventions on:

- New Diagnoses
- The proportion of all new diagnoses that are identified within –
  - Acute HIV infection, defined here as within the first 45 days after infection
  - >2 years after infection

The model was calibrated to recent estimates of HIV care continuum steps and PrEP utilization for MSM in the four counties representing Atlanta in Phase 1 of the EHE plan implementation, stratified by race (Table)

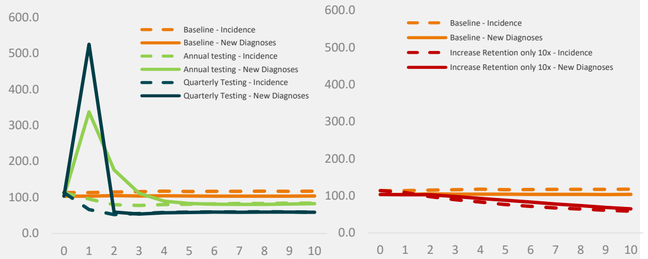
- e.g. Proportion of diagnosed who are virally suppressed
  - GA DPH surveillance, 2017 data Black/Hispanic/White calibration targets: 55%, 60%, 72%, respectively

Results

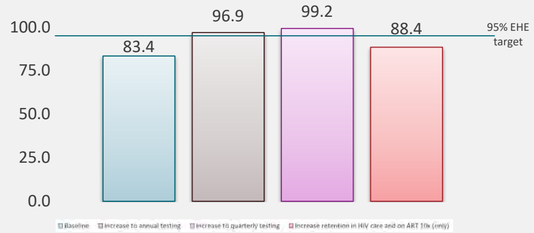
If we increase HIV screening rapidly in the earliest stages of elimination efforts, our model predicts an initial dramatic increase in new diagnoses, after which new HIV diagnoses would accurately measure incident HIV infections

- **In scenarios where HIV screening is not increased, new diagnoses may over or underestimate HIV incidence**

Congruence between unobserved true incident cases (dashed lines) and new diagnoses (solid lines) over 10 years of intervention



Proportion of all people with HIV who know they have it



Over 10 years, scenarios where screening occurs annually or quarterly would achieve the EHE target of 95% of people with HIV knowing they have it.

Over time the proportion diagnosed in the acute phase would increase, and the proportion diagnosed more than 2 years after infection would go down dramatically.

Proportion of all new HIV diagnoses identified while acutely infected and >2 years after infection

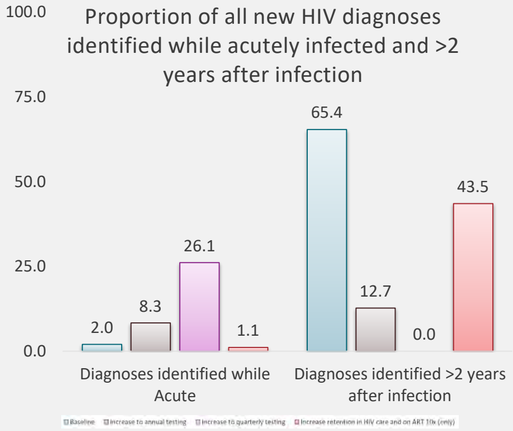


Table: Baseline rates of HIV screening and care retention, by race/ethicity, calibrated to the HIV epidemic in Atlanta, GA, 2019, and modeled 10-fold increases

	HIV Screening		HIV Care Retention	
	Mean time between HIV tests		Mean time before going off ART	
	Base	10xBase	Base	10xBase
Race				
Black MSM	5 years	26 weeks	3.1 years	31 years
Hispanic MSM	5 years	26 weeks	3.5 years	35 years
White/Other MSM	2.8 years	15 weeks	6.1 years	61 years

Discussion

In our model, at baseline levels of HIV screening, PrEP uptake, and HIV care retention, the number of new diagnoses remained stable over 10 years and underestimated true HIV incidence.

- **In scenarios where only HIV care retention improved, the number of incident HIV infections decreased faster than the number of new diagnoses, resulting in new diagnoses overestimating HIV incidence by year 2 of the intervention**
- **Conversely, if HIV screening is increased, there is dramatic increase in new diagnoses, and subsequently new HIV diagnoses become a direct measure of incident HIV infections**
  - When the rate of HIV screening is increased to annual screening of MSM, HIV diagnoses became equivalent with HIV incidence by year 5 of the intervention
  - When the rate of HIV screening is increased to approximate quarterly screening of MSM, HIV diagnoses became equivalent with HIV incidence by year 3 of the intervention

As HIV incidence decreases and the proportion of all those living with HIV infection who know they have it increases, the percentage of all new diagnoses meeting the laboratory test-based definition of acute HIV infection should also increase.

- **This is another marker that local jurisdictions may consider to measure progress towards HIV elimination**

Limitations

This model was parameterized to the state of HIV epidemic in Atlanta, GA, and only includes Men who have Sex with Men

- **In other jurisdictions and/or populations that have already achieved higher rates of HIV testing, new HIV diagnoses may already approximate HIV incidence**

Conclusion

These results suggest one strategy for jurisdictions seeking to simultaneously reduce HIV incidence and improve their ability to track their epidemic would be to dramatically increase HIV screening in the earliest stages of elimination efforts.

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