HRSA
Health Resources & Services Administration

Public Health Response to Clusters and Outbreaks 101

2020 National Ryan White Conference on HIV Care and Treatment

August 11, 2020

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Vision: Healthy Communities, Healthy People

Disclosures

Susan Robilotto has no relevant financial or non-financial interests to disclose.

Disclosure will be made when a product is discussed for an unapproved use.

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Commercial support was not received for this activity.

Learning Outcomes

At the conclusion of this activity, participants will be able to:

1. Provide definitions for HIV cluster and HIV outbreak
2. Identify different methodologies for rapidly detecting increases in HIV incidence
3. Create local examples for responding to HIV clusters and outbreaks

Health Resources and Services Administration (HRSA) Overview

- Supports more than 90 programs that provide health care to people who are geographically isolated, economically or medically vulnerable through grants and cooperative agreements to more than 3,000 awardees, including community and faith-based organizations, colleges and universities, hospitals, state, local, and tribal governments, and private entities

- Every year, HRSA programs serve tens of millions of people, including people with HIV/AIDS, pregnant women, mothers and their families, and those otherwise unable to access quality health care

HRSA's HIV/AIDS Bureau (HAB) Vision and Mission

Vision

Optimal HIV/AIDS care and treatment for all.

Mission

Provide leadership and resources to assure access to and retention in high quality, integrated care, and treatment services for vulnerable people with HIV/AIDS and their families.

HRSA's Ryan White HIV/AIDS Program

- Provides comprehensive system of HIV primary medical care, medications, and essential support services for low-income people with HIV
  - More than half of people with diagnosed HIV in the United States – nearly 519,000 people – receive care through the Ryan White HIV/AIDS Program (RWHAP)
- Funds grants to states, cities/counties, and local community based organizations
  - Recipients determine service delivery and funding priorities based on local needs and planning process
- Payor of last resort statutory provision: RWHAP funds may not be used for services if another state or federal payer is available
- 87.1% of Ryan White HIV/AIDS Program clients were virally suppressed in 2018, exceeding national average of 62.7%

Source: HRSA. Ryan White HIV/AIDS Program Annual Client-Level Data Report 2018; CDC. HIV Surveillance Supplemental Report 2018;21(No. 4)

HRSA Ryan White HIV/AIDS Program

Overview of Public Health Response Institute

- **Session 101: What is a cluster and why does it matter?**
- Session 201: Public health approach to addressing clusters and outbreaks – How does your organization fit into a response?
- Session 301: Taking lessons learned from clusters and applying it in your system of care

Public Health Response to Clusters and Outbreaks 101

- **What is a cluster?**
  - CDR Anne Marie France, PhD, MPH
    Epidemiologist, Transmission and Molecular Epidemiology Team
    HIV Incidence and Case Surveillance Branch
    Division of HIV/AIDS Prevention, CDC
- **Why is this important?**
  - Susan Robilotto, DO
    Director, Division of State HIV/AIDS Programs (DSHAP)
    HIV/AIDS Bureau (HAB)
    Health Resources and Services Administration (HRSA)
- **Jurisdictional Perspective**
  - Colin Flynn, ScM
    Chief, Center for HIV Surveillance, Epidemiology and Evaluation
    Maryland Department of Health

HRSA Ryan White HIV/AIDS Program

Public Health Response to Clusters and Outbreaks

What is a cluster, and why does it matter?

CDR Anne Marie France, PhD, MPH
Epidemiologist, Transmission and Molecular Epidemiology Team
HIV Incidence and Case Surveillance Branch
Division of HIV/AIDS Prevention, CDC

Ending the HIV Epidemic

Cluster and Outbreak Response Can Help Bring the Nation Closer to Ending the HIV Epidemic

- Cluster and outbreak detection allow us to identify when HIV is spreading quickly.
- A cluster or outbreak indicates gaps in our prevention services that need to be addressed to improve access to services and stop transmission.
- Cluster and outbreak response use standard prevention approaches in a more focused way.

DISCLOSURES

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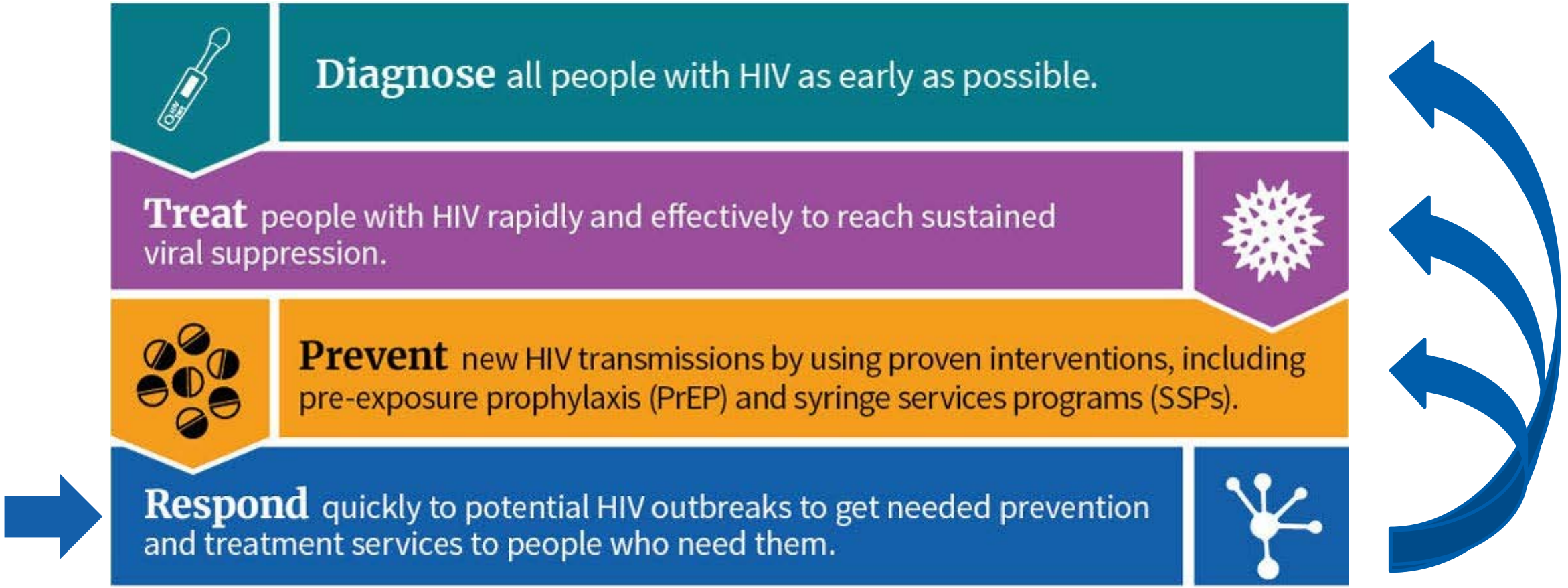
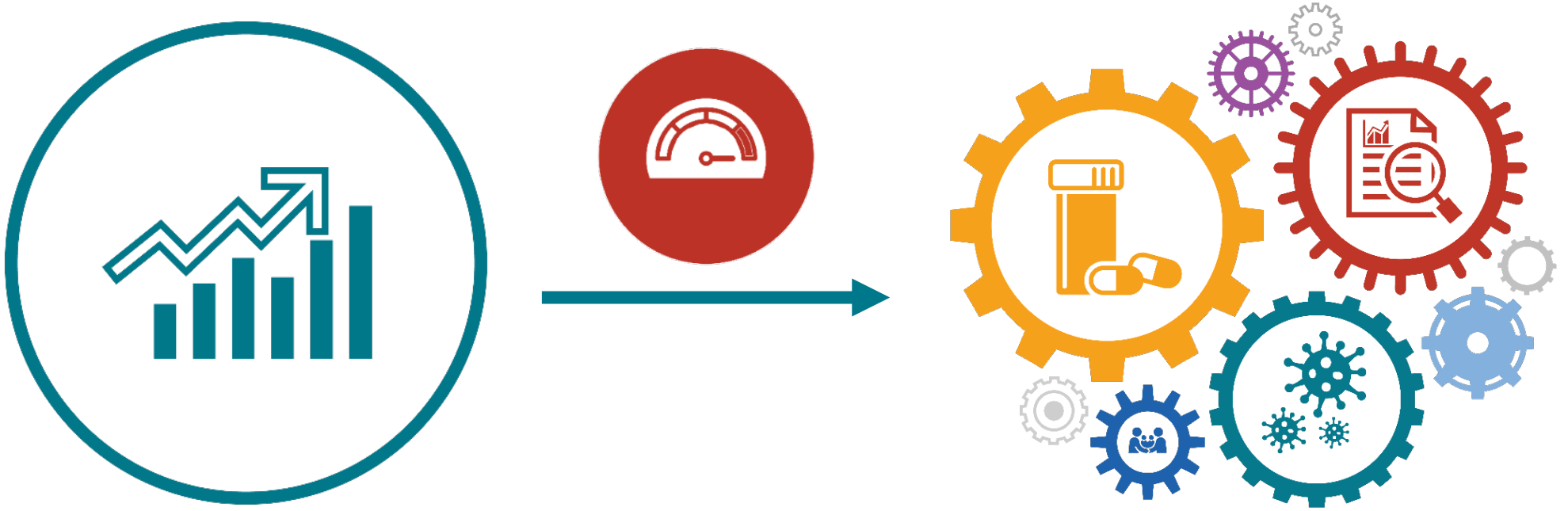
Ending the HIV Epidemic: Response Guides Other Strategies



Ending the HIV Epidemic

www.HIV.gov

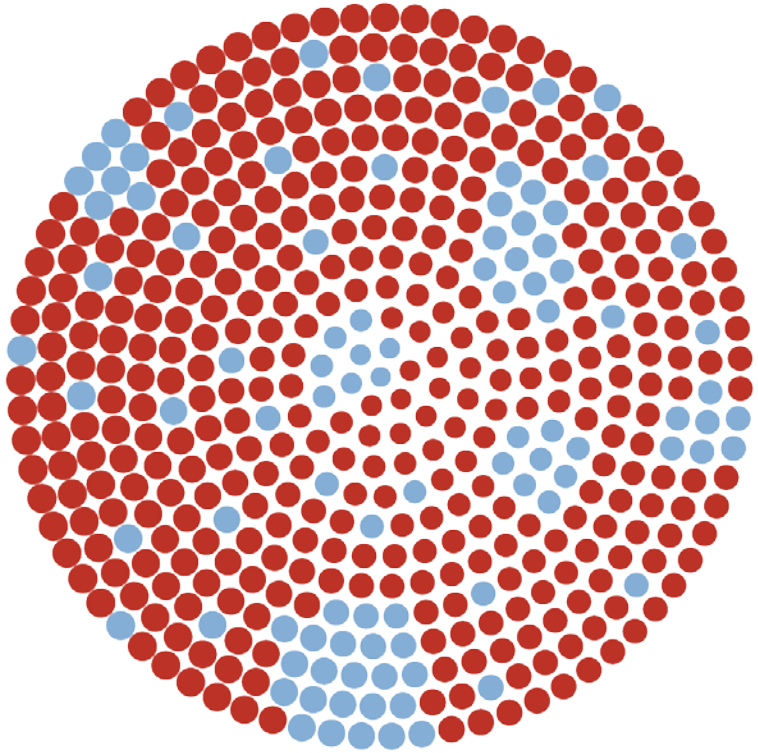
Cluster and Outbreak Response Involves Accelerating the Use of Data to Guide Programs



Background about HIV Transmission

HIV Is Transmitted Through Networks

Transmission is not uniform

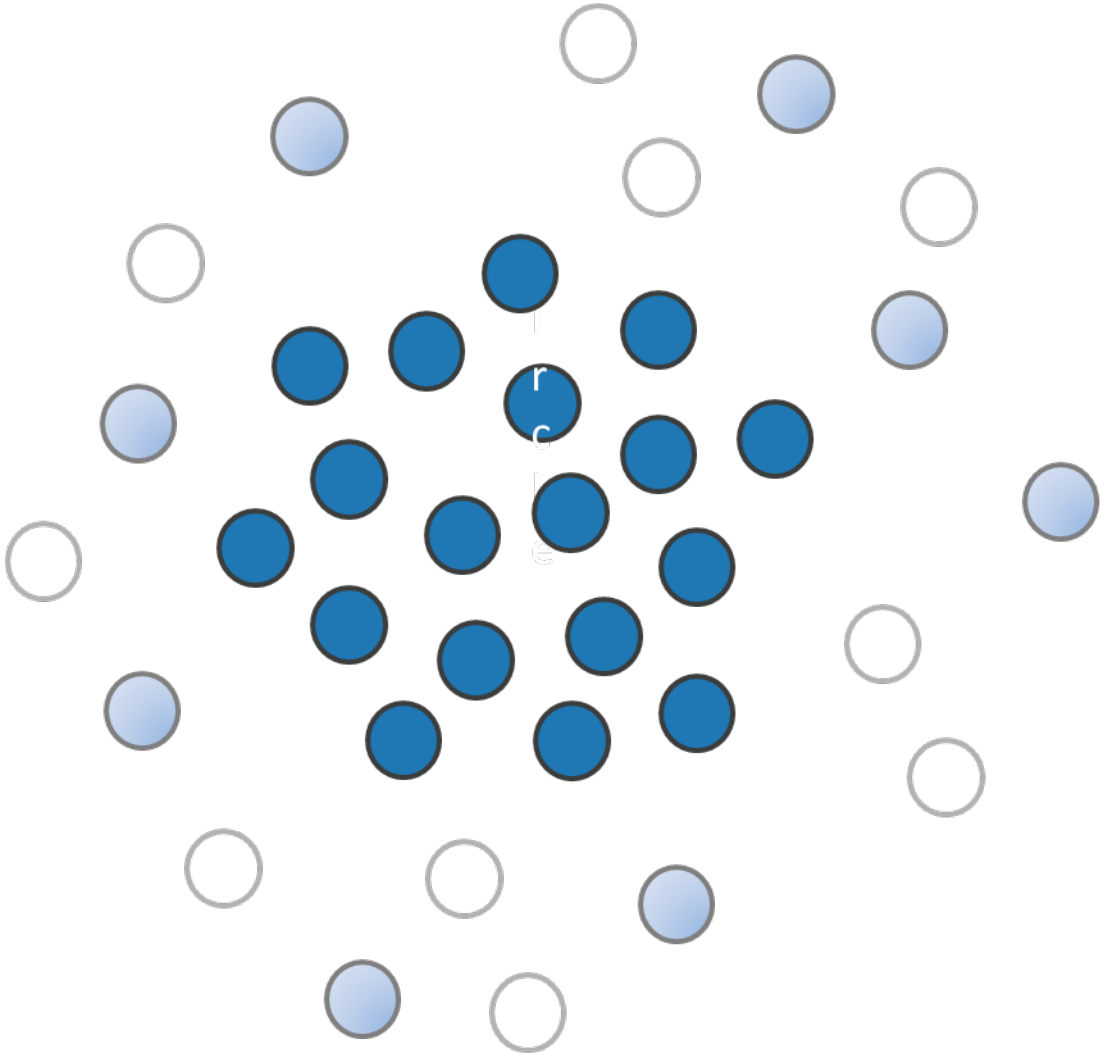


Identify networks in which HIV is spreading quickly

⇩

Help people get into care and prevent HIV

Networks Include People with and without HIV



Diagnosed

Undiagnosed

At risk

Identifying Rapid HIV Transmission

Traditional epidemiology

Challenges to this approach for HIV

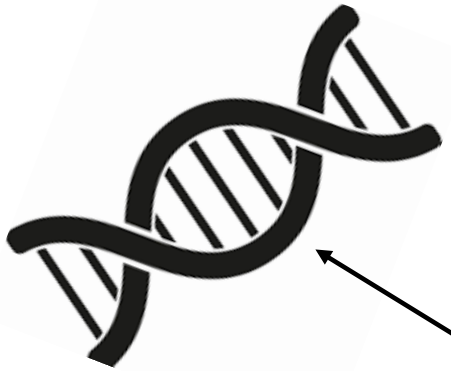
Delayed diagnosis

Population mobility

High-burden areas

Cluster and Outbreak Detection

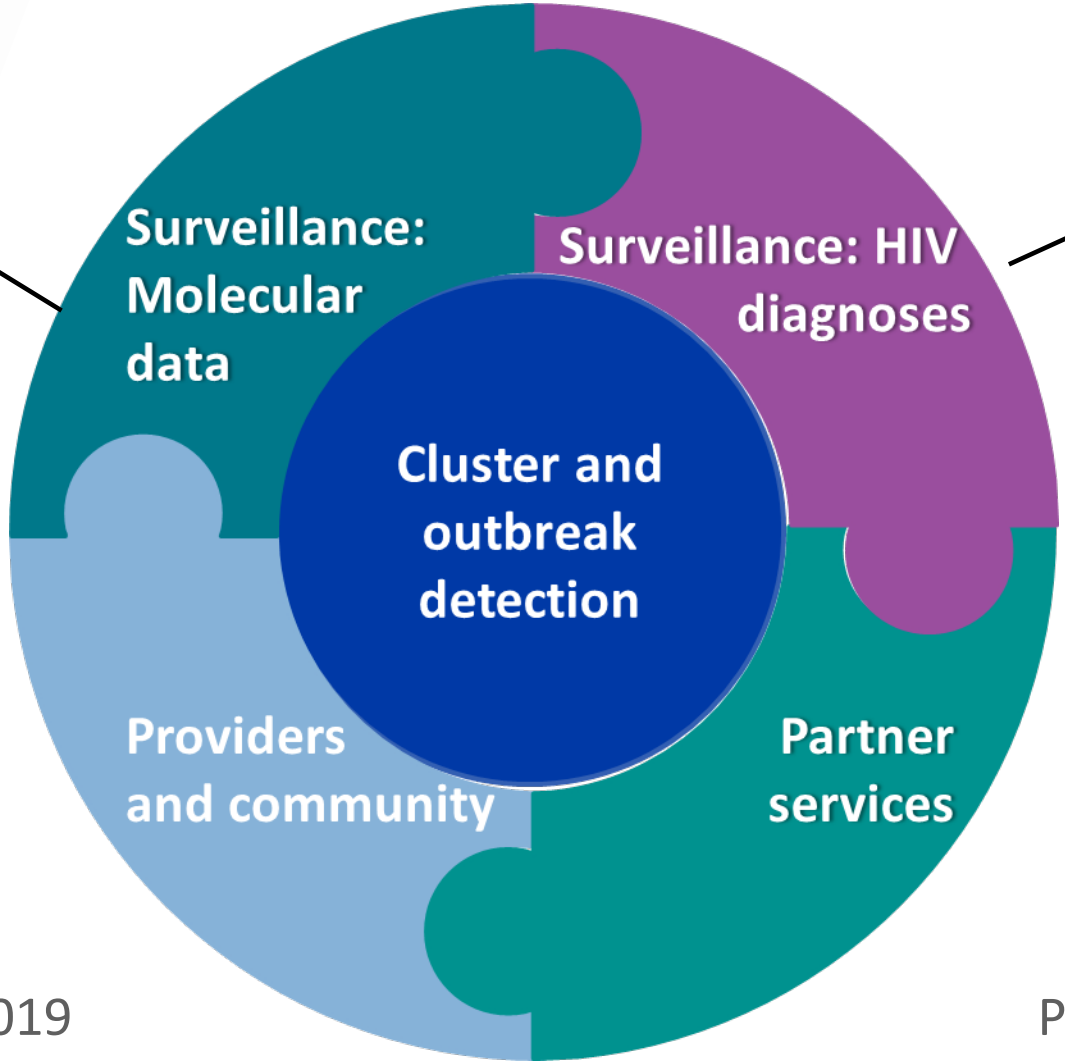
Molecular clusters



Oster AM, France AM *et al*. *JAIDS* 2018
Oster AM *et al.* CROI 2020

Time-space clusters

McClung RP *et al.* CROI 2020
Conyngham SC *et al.* NHPC 2019
Samoff E *et al.* AJPH 2020
Fitzmaurice A *et al.* EID 2019



Cranston K *et al.* MMWR 2019
Alpren C *et al.* AJPH 2019

Peters PJ *et al.* NEJM 2016
Golden MR *et al.* MMWR 2019

U.S. National HIV Surveillance System

People with HIV

Providers and laboratories

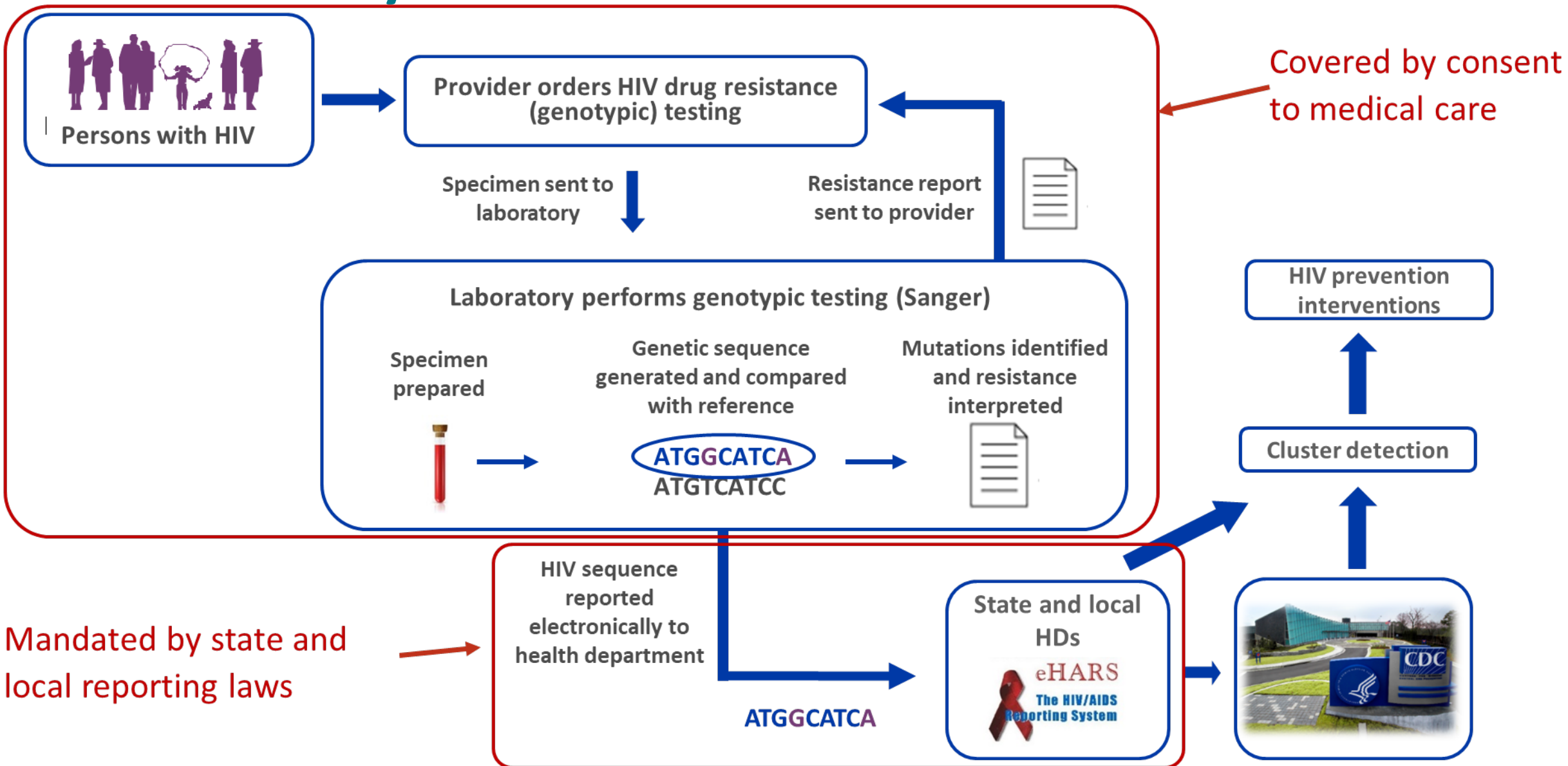
Case reports & laboratory results

State and local health departments

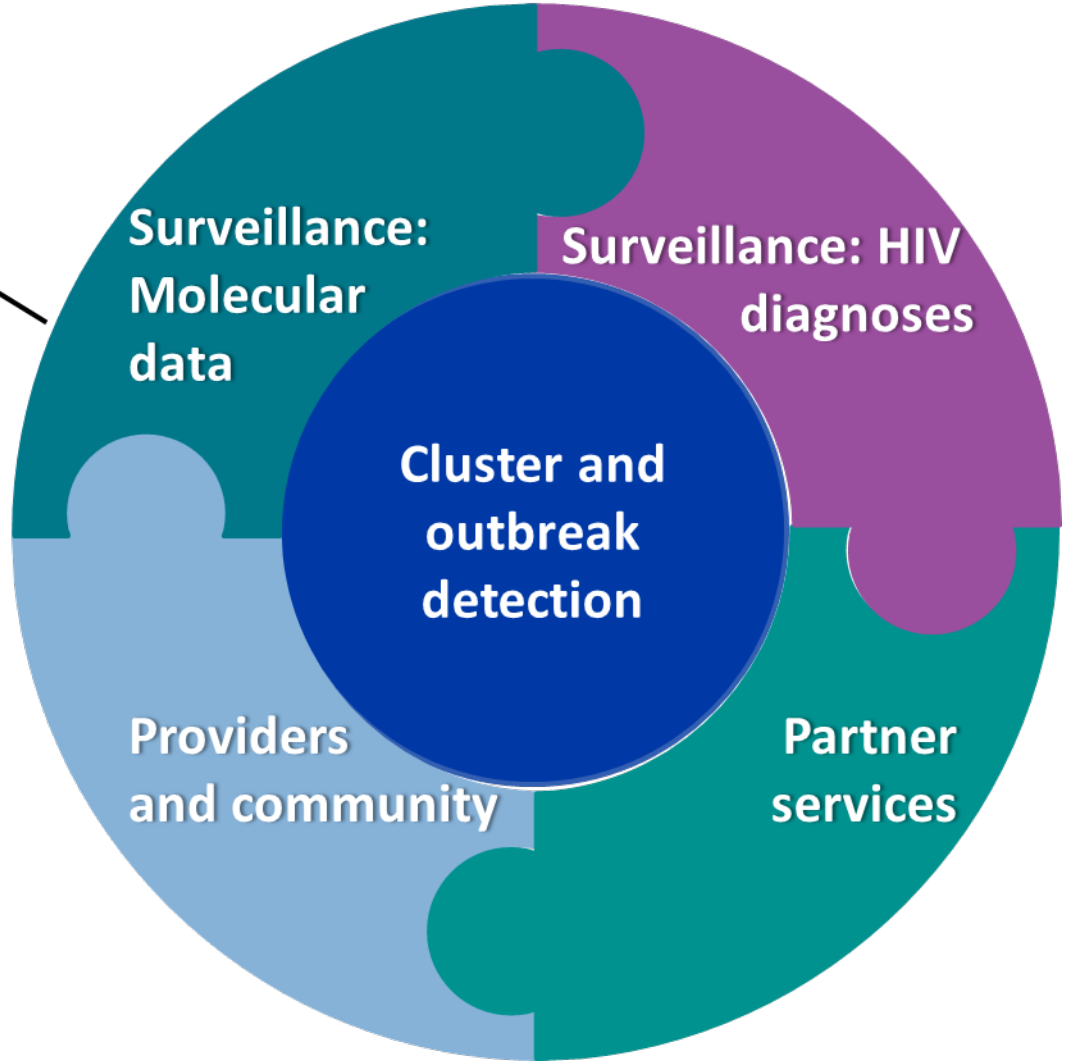
De-identified data

Prevent infections
Improve care
Reduce disparities

How Are Molecular Data Collected by the National HIV Surveillance System?

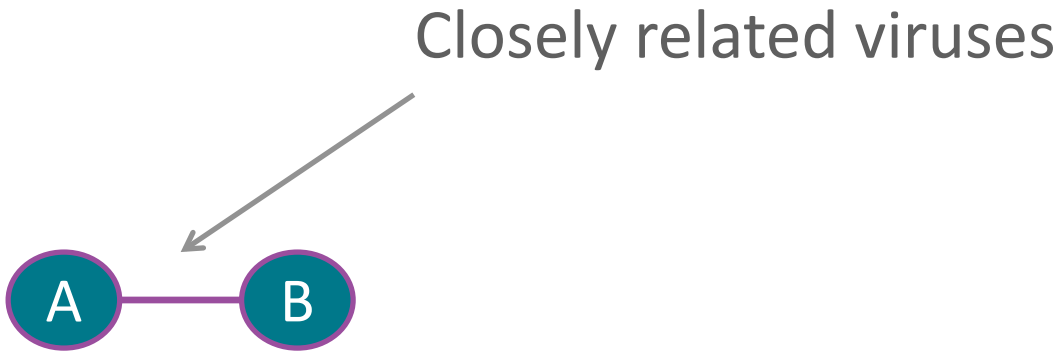


Molecular clusters

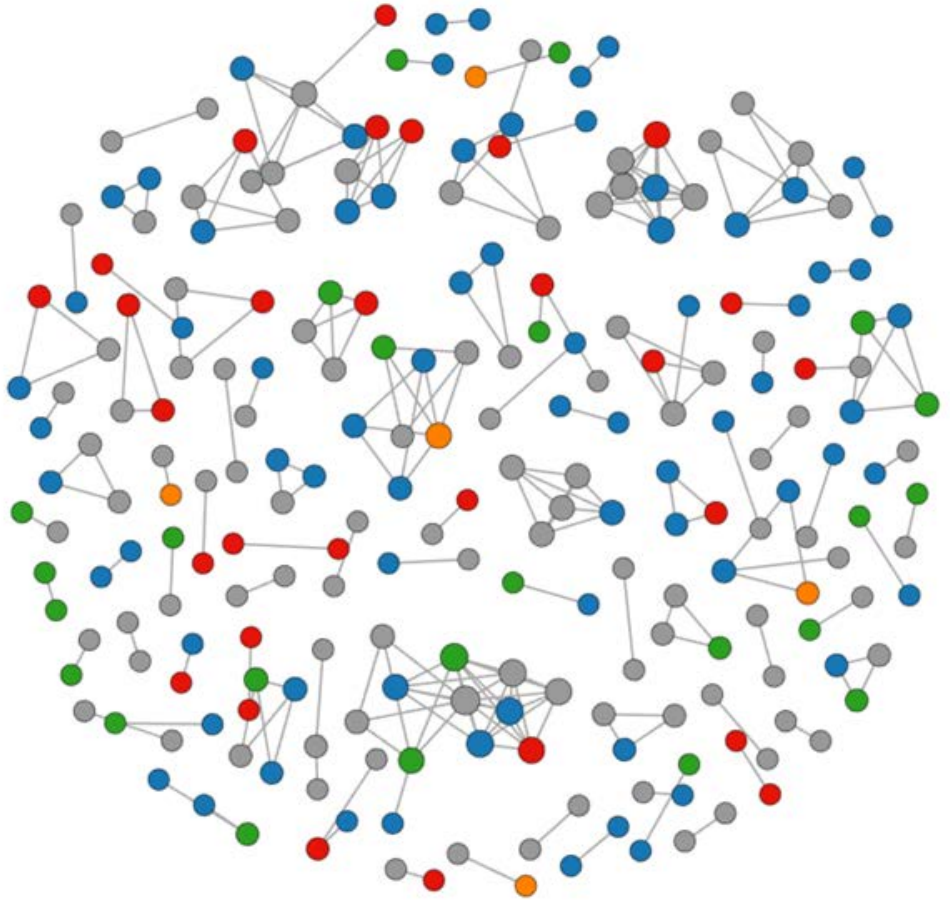


Transmission Network Analysis

- Compares each pair of sequences



- Easy to understand
- Scalable to millions of sequences



HIV-TRACE: Kosakovsky Pond *et al.* MBE 2018

What Does it Mean When Two Nucleotide Sequences are Closely Related?

Person A infected person B

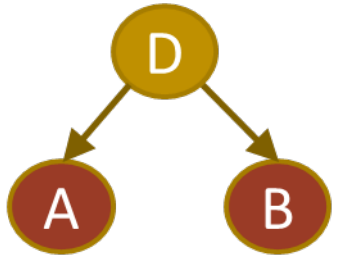
OR

Person B infected person A

OR

Person A infected person C, who infected person B

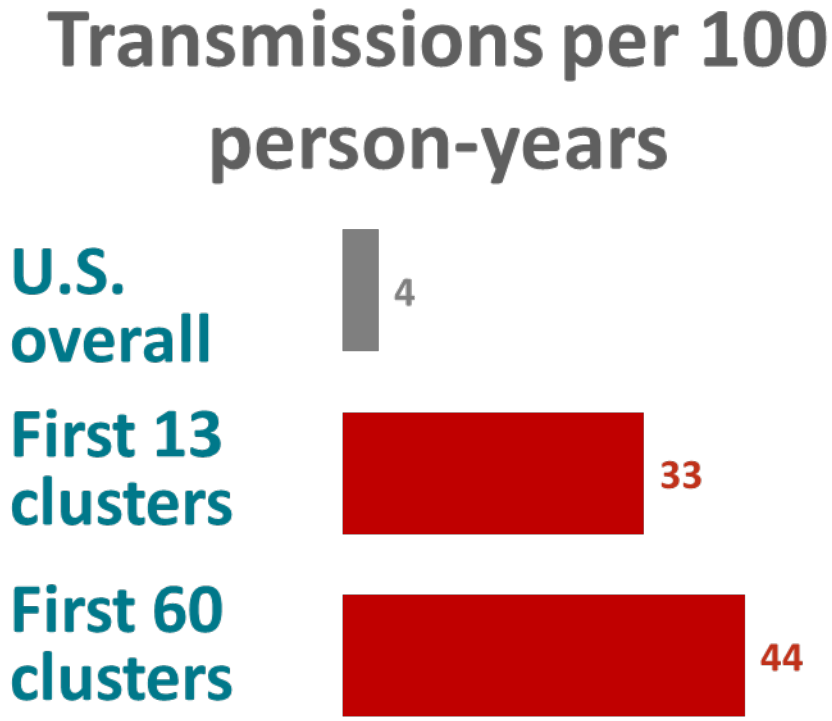
OR



Persons D infected persons A and B

We can infer that there is either a direct OR indirect epidemiologic link
We cannot infer directionality of transmission

CDC Approach to Detecting Clusters

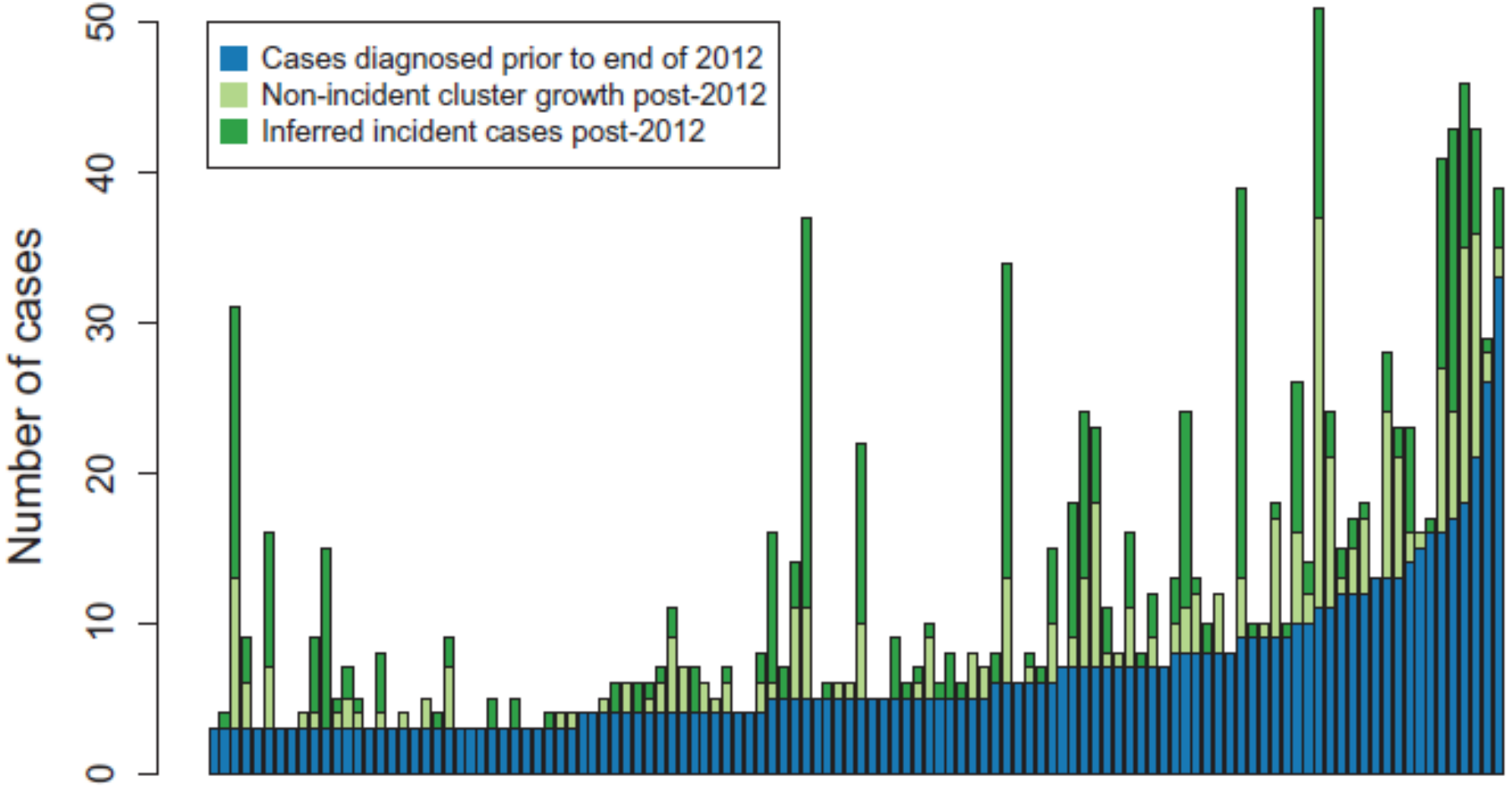


- Most clusters were primarily MSM
- None recognized through epidemiologic methods alone
- **Rapid transmission can be hard to detect without sequence data**

Oster, France *et al*. *JAIDS* 2018

France *et al*. CROI 2018

Clusters Continue to Grow After Detection



71% of growing clusters continued to grow

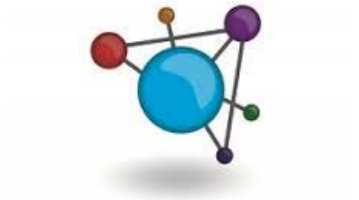
63% of clusters grew due to new (incident) infections

59% of clusters grew due to previously undiagnosed infections

Wertheim JO, Panneer N, France AM, Saduvala N, Oster AM. Incident infection in high-priority HIV molecular transmission clusters in the United States. AIDS. 2020;34(8):1187-1193.

Current Status of U.S. Cluster Analysis

- ~44% of diagnoses in recent years have sequences
- Sequences for > 400,000 diagnoses
- National analysis: > 240 priority clusters to date
- State and local health departments have authority and responsibility to respond
- Data available in closer to real time at state level
  - Built tools to enable analysis by HD staff without expertise in bioinformatics



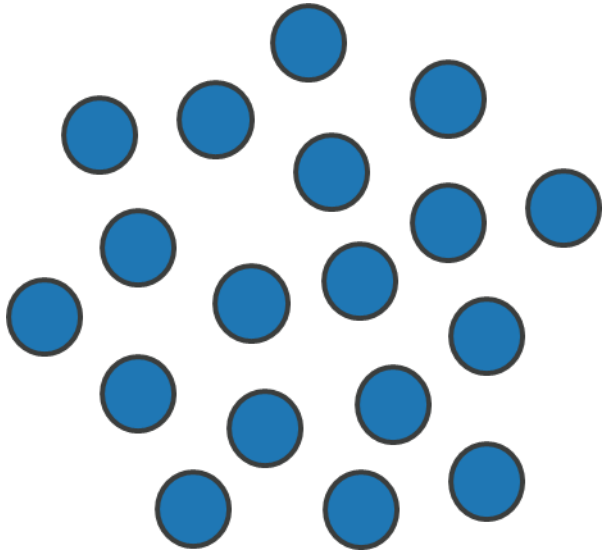
Cluster and Outbreak Response

Clusters and Outbreaks

- Groups of people among whom there is suspected rapid transmission
- Can be detected using various approaches
- Range of concerning levels of transmission
  - Clusters and outbreaks exist on the same spectrum
- Response to clusters and outbreaks should be guided by
  - Local epidemiology
  - Context
  - Level of concern for ongoing transmission

How Public Health Agencies Respond to Clusters and Outbreaks

- Reach out to these networks
  - Provide the services they need
  - Understand barriers to care and prevention
  - Develop approaches to overcome barriers



Cluster and Outbreak Response Use Traditional HIV Prevention Approaches

Network level: Investigate and intervene	Program level: Identify and address gaps in programs/services
Partner services Social network strategies Testing PrEP Syringe service programs Linkage to HIV care	Testing Care PrEP Partner services Syringe service programs Communication

Response Intensity Can Vary Along a Spectrum

- Larger numbers of smaller clusters
- More commonly related to sexual transmission
- More commonly detected through molecular analysis
- Requires building a routine program
- May require scale-up of services
- Can help to advance needed programmatic changes

- Fewer, larger clusters
- More commonly related to injection drug use
- More commonly detected through time-space analysis
- May require surge capacity
- Often requires major scale-up of services
- Can help to advance needed programmatic changes

Fundamental needs

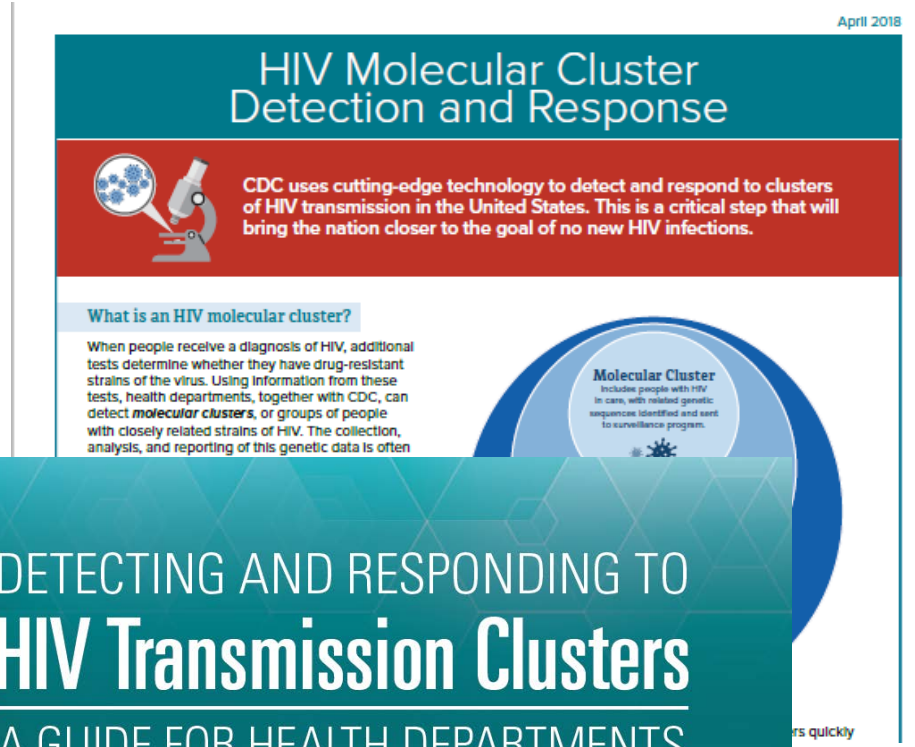
Infrastructure and capacity for detection

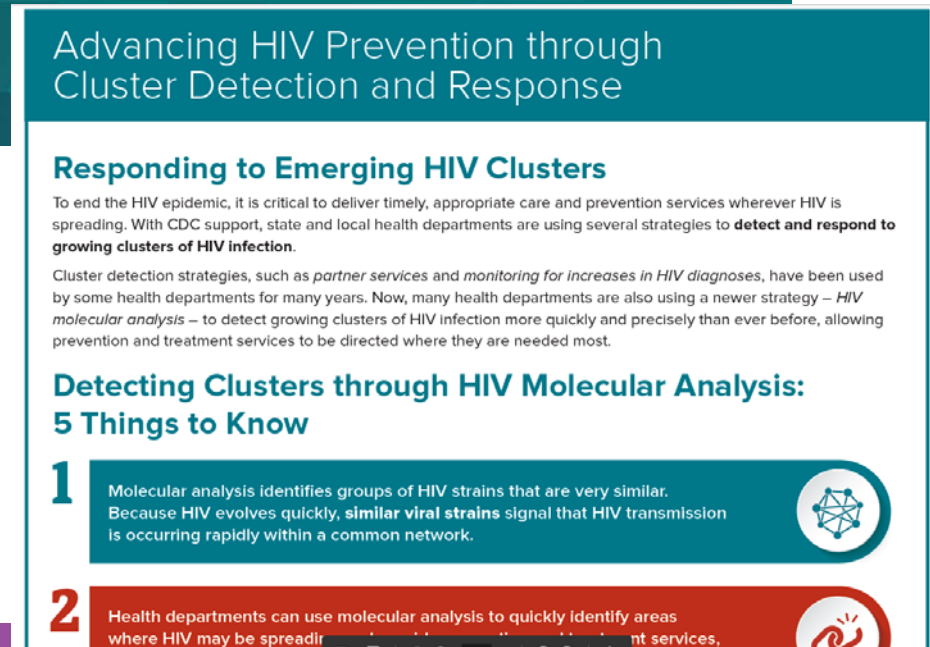
Procedures and fiscal mechanisms for response

Communications and policy

Resources Available at www.cdc.gov/HIVcluster

- Cluster guidance (Detecting and Responding to HIV Transmission Clusters)
- Cluster detection and response infographic
- HIV molecular cluster fact sheet
- Link to information about drug resistance testing
- Resources regarding outbreaks among PWID





Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Why is Cluster and Outbreak Detection and Response Important?

HIV Incidence in the United States

- HIV Incidence has remained fairly steady from 2014 through 2018[1]
- Approximately 80 % of new HIV transmissions are from people who are unaware of their infection or are not receiving care[2]
- Among new HIV diagnosis in 2018, 20.8% were stage 3 (AIDS)[3]

1. Centers for Disease Control and Prevention. Estimated HIV incidence and prevalence in the United States, 2014–2018. *HIV Surveillance Supplemental Report* 2020;25(No. 1). http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Published May 2020.

2. Li Z, Purcell DW, Sansom SL, Hayes D, Hall HI. *Vital Signs:* HIV Transmission Along the Continuum of Care — United States, 2016. MMWR Morb Mortal Wkly Rep 2019;68:267–272. DOI: http://dx.doi.org/10.15585/mmwr.mm6811e1

3. Centers for Disease Control and Prevention. Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas, 2018. *HIV Surveillance Supplemental Report* 2020;25(No. 2). http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Published May 2020.

HRSA Ryan White HIV/AIDS Program

Benefits of Cluster and Outbreak Detection and Response

- Interrupt transmission of HIV
- Engage populations that are difficult to reach
- Better understand barriers to prevention and HIV treatment and care
- Improve HIV prevention and care services
- Reach goals of Ending the HIV Epidemic: A Plan for America

Interrupt Transmission of HIV

- Target appropriate prevention resources to community
- Engage those with HIV in treatment earlier
- Educate community on HIV risks and resources available

Engage Populations That are Difficult to Reach

- Focus response to address the affected community
- Forge new partnerships and collaborations
- Impact disparities that put communities at risk for rapid HIV transmission

Better Understand Barriers to Prevention and HIV Treatment and Care

- Identify factors that put the communities at risk
- Identify factors that are preventing identification of risk
- Identify factors that delay care and treatment

Improve HIV Prevention and Care Services

- Identify gaps and barriers in the system of care
- Understand the other partners and stakeholders that can be leveraged
- Implement a system of care that is impactful and efficient

Reach Goals of Ending the HIV Epidemic: A Plan for America

- 10 year initiative, with the first 5 years focusing resources on areas where HIV transmission occurs most frequently
  - 47 jurisdictional awards: 39 RWHAP Part A, Ohio (for Hamilton County) and 7 State
- Cluster and outbreak detection and response touches all four pillars of the initiative
- Employing available techniques to identify new HIV transmission and target resources is imperative for meeting the goals of the initiative

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HIV Cluster Detection and Response in Maryland

Colin Flynn, ScM

Chief, Center for HIV Surveillance, Epidemiology and Evaluation

August 2020

Disclosures

Colin Flynn receives grant support from: the Centers for Disease Control and Prevention and the Health Resources and Services Administration.

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Learning Outcomes

At the conclusion of this activity, participants will be able to:

1. Describe how HIV cluster detection and response activities operate in Maryland

2. Recognize the benefits of an integrated approach to HIV cluster detection and response

3. Plan for integrating HIV cluster detection and response activities into their operations

Where are We Today?

- HIV Cluster Response Team
- Multiple methods of cluster detection
- Active monitoring and response to clusters
- 52 clusters as of June 2020
- Decreasing HIV incidence
- Increasing HIV viral suppression

Monitoring

- Biweekly meetings of the state health dept.'s HIV Cluster Response Team
- HIV surveillance, STI surveillance, HIV/STI partner services, HIV prevention, Ryan White program
- An HIV surveillance epidemiologist and an HIV/STI partner services epidemiologist are assigned to each cluster
- Monthly data abstracts from surveillance and partner services data bases used to identify new clusters and update existing clusters

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Cluster Detection

- Five types of clusters of HIV cases
  - Clusters of diagnoses reported by clinicians
  - Clusters of cases with named partners identified from health department interviews
  - Co-infections with other disease outbreaks (Hepatitis A, Shigella, Tuberculosis)
  - Geospatial (time-space) clusters identified using epidemiological data
  - Sequence-linked clusters identified using results from genotypic resistance tests
- Can identify networks of people where there is active transmission of HIV

Maryland Cluster Investigations

	2015	2016	2017	2018	2019
Clinician	0	0	0	0	0
Health Dept	1	0	0	1	0
Co-Infections	1	1	1	0	0
Time-Space	1	3	0	1	1
Sequences CDC	1	2	3	6	3
Sequences Maryland	2	0	0	5	12
Sequences Other State	0	0	0	1	2
Total	6	6	4	14	18

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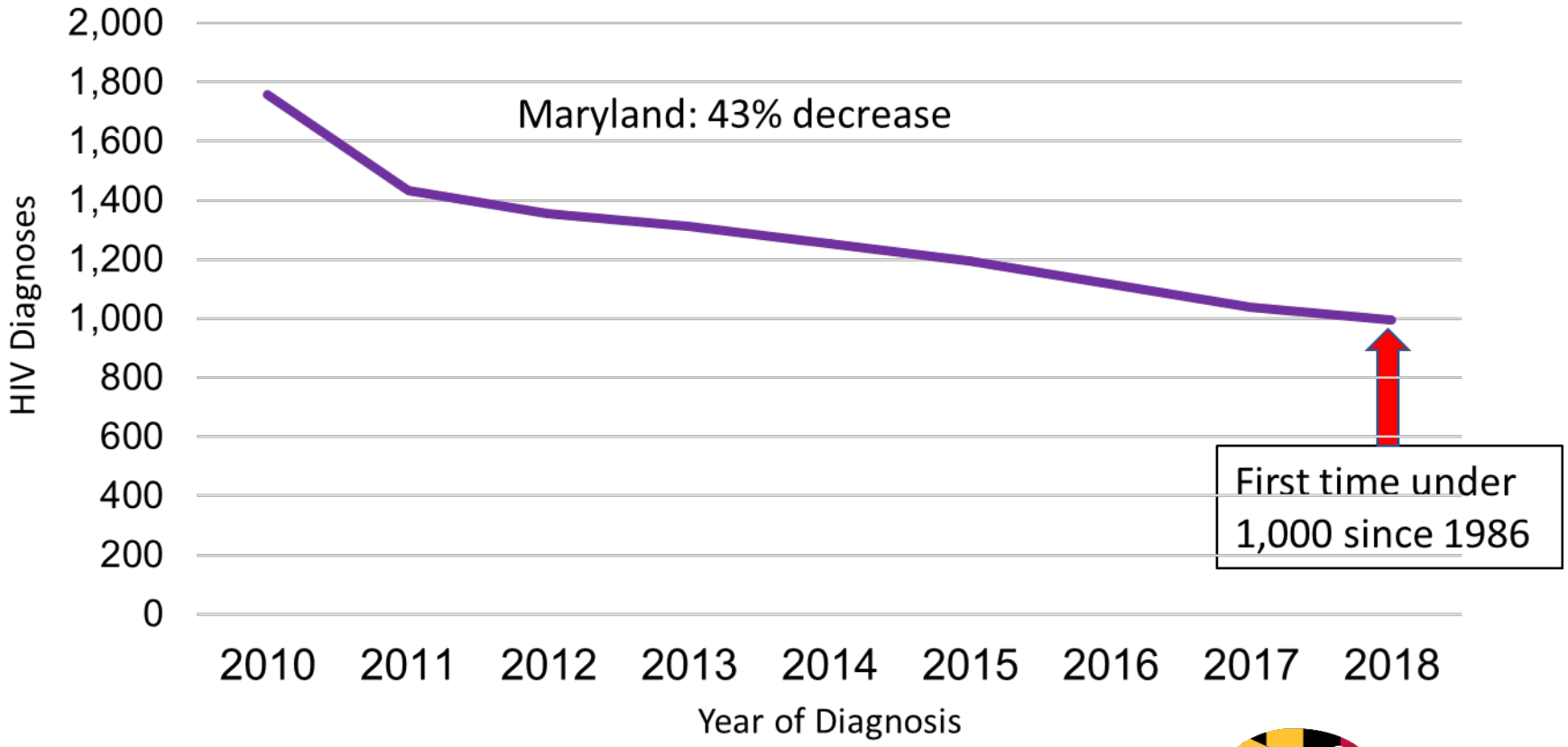
HIV Diagnosis Trends



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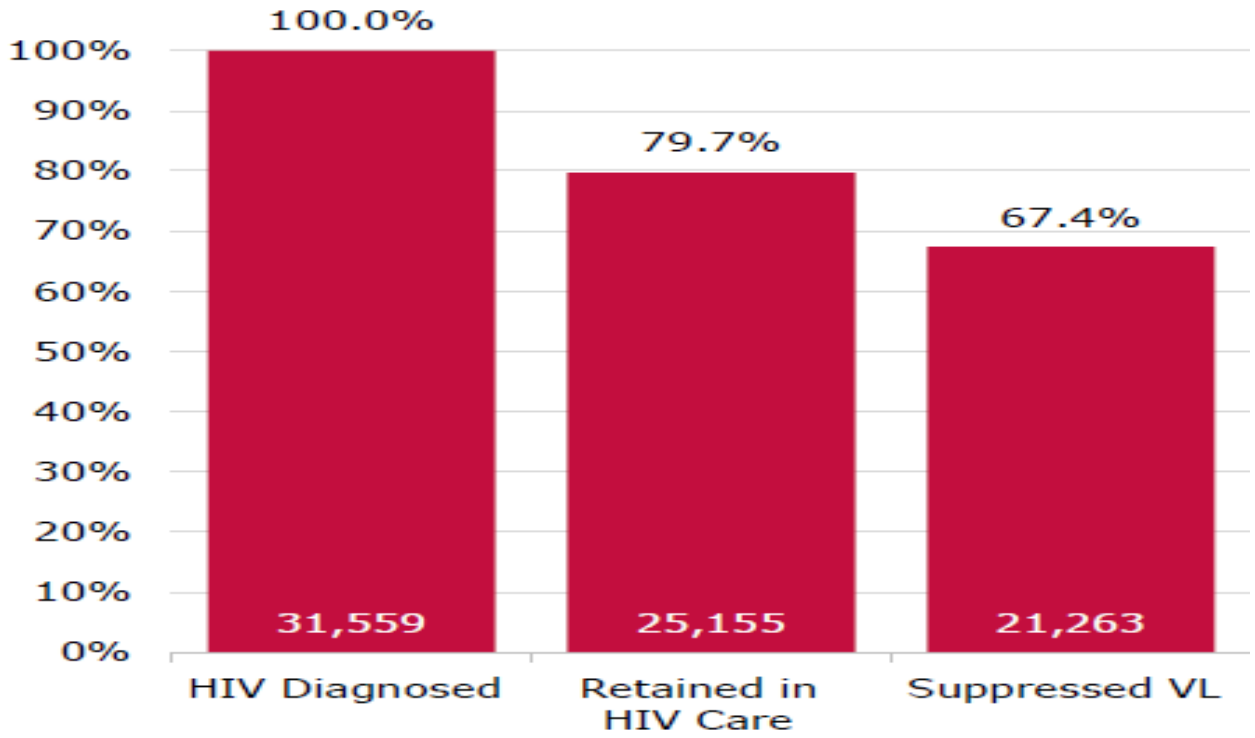
Data as reported through 6/30/2019

HIV Continuum of Care

Diagnosis-based HIV Continuum of Care, Maryland 2018



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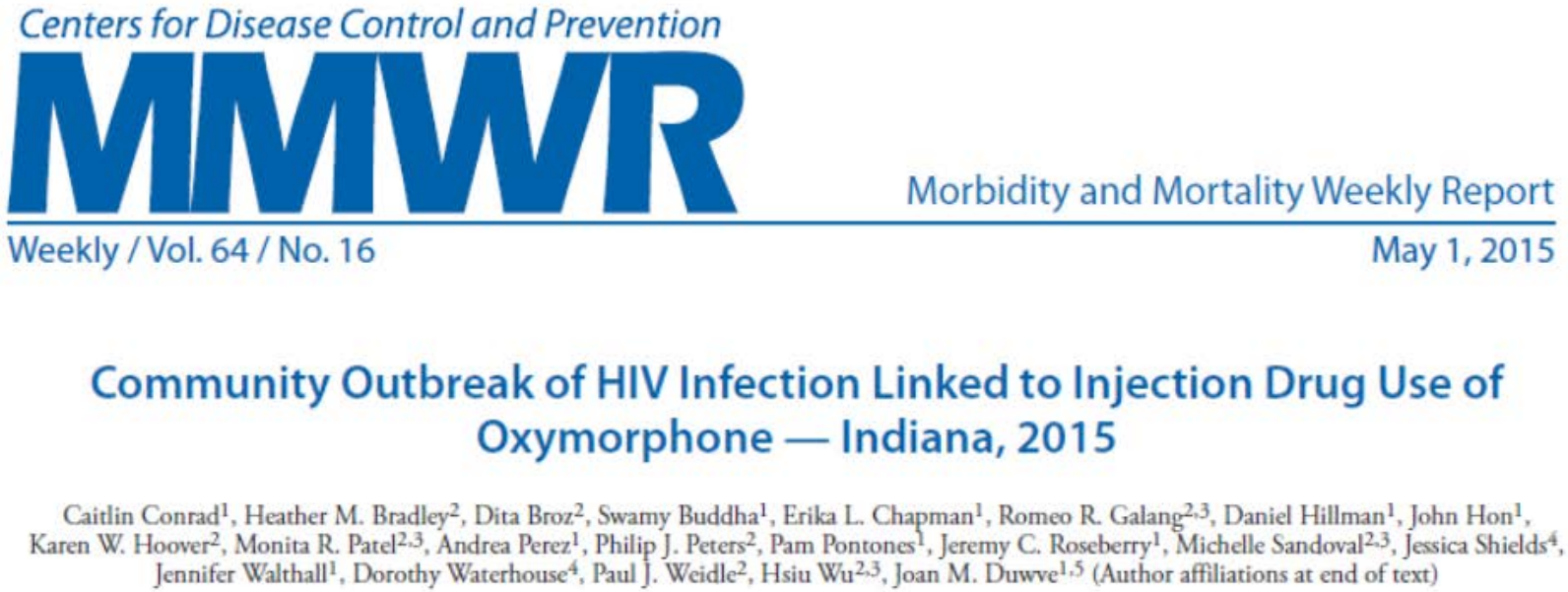
How Did We Get Here?

- It all started in Indiana
- Actually, it started in Los Angeles
- Really, it started in London

Indiana Outbreak



Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

Weekly / Vol. 64 / No. 16

May 1, 2015

Community Outbreak of HIV Infection Linked to Injection Drug Use of Oxymorphone — Indiana, 2015

Caitlin Conrad[1], Heather M. Bradley[2], Dita Broz[2], Swamy Buddha[1], Erika L. Chapman[1], Romeo R. Galang[2,3], Daniel Hillman[1], John Hon[1], Karen W. Hoover[2], Monita R. Patel[2,3], Andrea Perez[1], Philip J. Peters[2], Pam Pontones[1], Jeremy C. Roseberry[1], Michelle Sandoval[2,3], Jessica Shields[4], Jennifer Walthall[1], Dorothy Waterhouse[4], Paul J. Weidle[2], Hsiu Wu[2,3], Joan M. Duwve[1,5] (Author affiliations at end of text)

3 reported diagnoses of HIV in a small rural town, upon investigation, were found to be 150+ cases of IDU-associated HIV and HCV

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Indiana – Sequence Analysis

- There had been multiple introductions of HCV over the preceding years
- There was a single introduction of HIV, perhaps 4 years earlier
- As many as half of infections had occurred by the time the outbreak was identified
- CDC – could our resistance surveillance be used to detect other HIV outbreaks?

First Maryland Clusters – 2015

- May – Indiana outbreak MMWR
- June – Health Officers Memo
- July – local health dept. reported 3 new cases (grew to 6) in a small rural town that averaged 1/year
- August – new state health dept. software program identifies 3 new cases (grew to 5) in a rural county that average 1 every 2 years
- September – CDC's new sequence analysis identifies 5 recent IDU cases in Baltimore City

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Los Angeles – 1981

- June 1981 MMWR
- CDC and LA County health department report on 5 cases of a rare pneumonia from 3 different hospitals in otherwise healthy young gay men
- No identified connections between the cases
- Further investigations (cluster response) found more cases in more cities, identified epidemiological links between cases, and described likely methods of transmission of an unknown pathogen

London – 1800's

- Cholera outbreak in London
- Unknown pathogen or source of transmission
- John Snow mapped cholera cases and identified that they clustered around one water pump
- Removed pump handle and the cases stopped (cluster response)

What Does it Look Like?

- Detailed descriptions of clusters
- Cluster response is a data-to-care activity
- Integrated plan
- Integrated response
- Integrated funding

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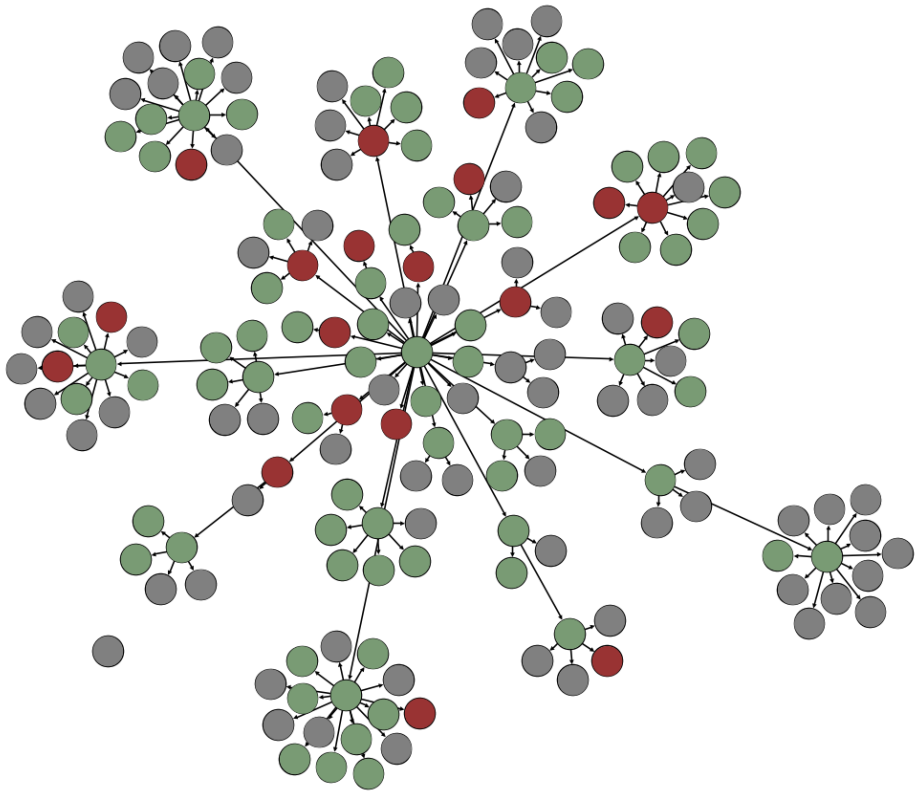
Network Diagram



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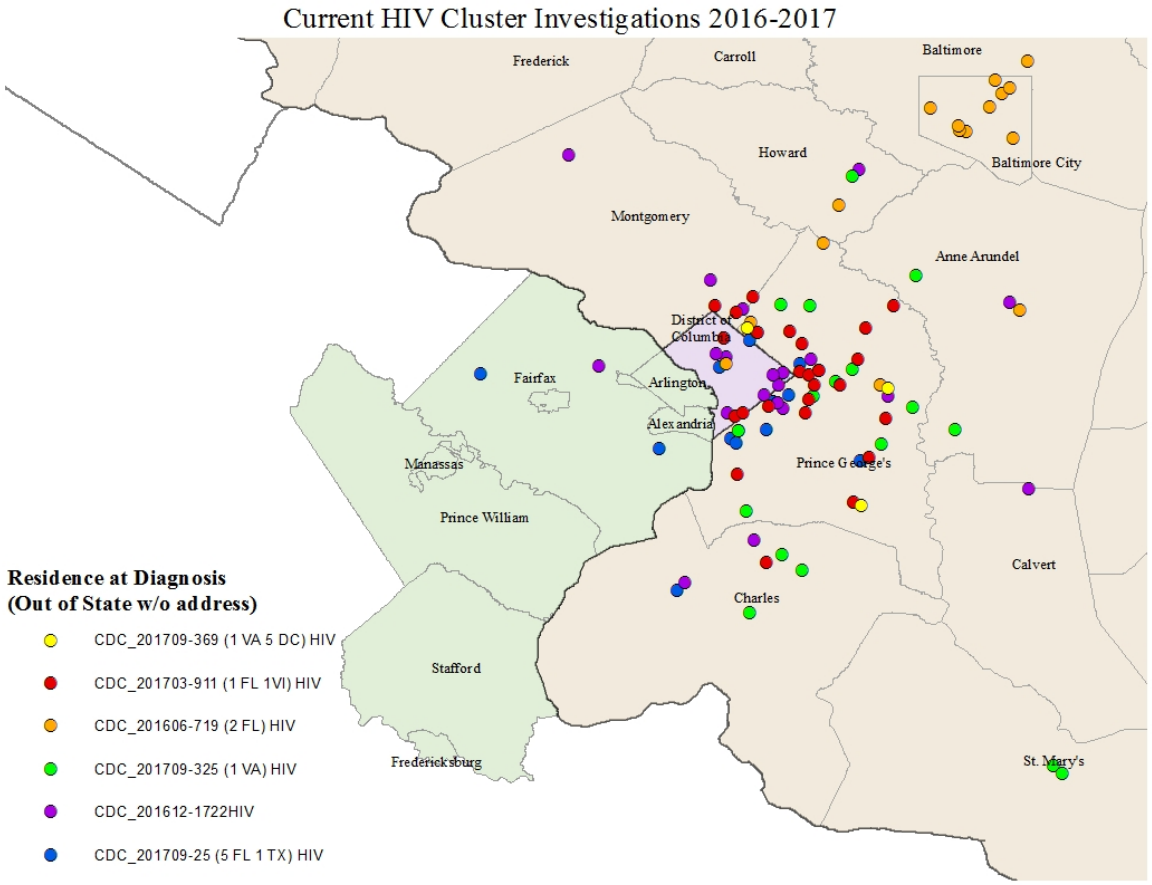
Geographic Map



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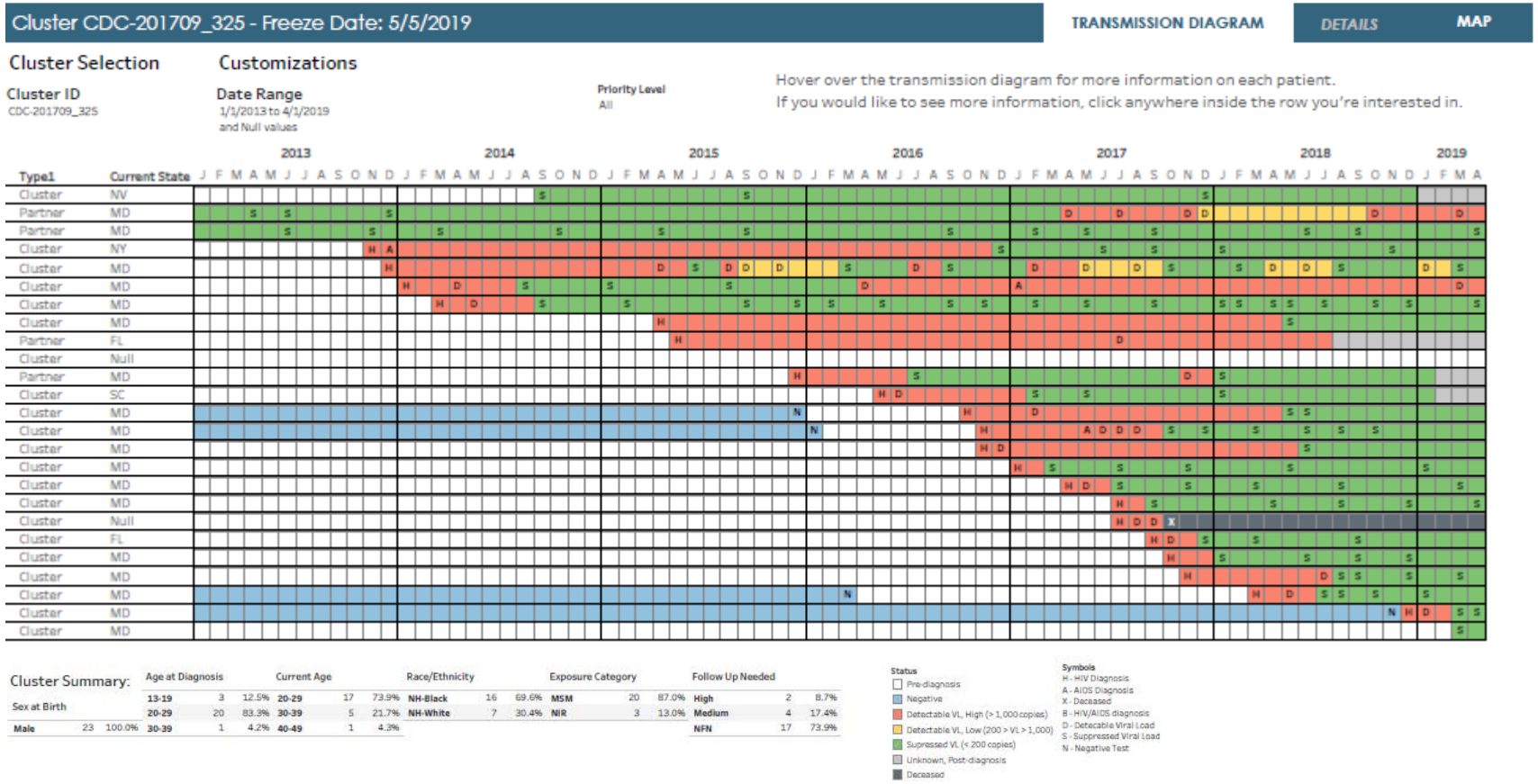
Transmission Diagram



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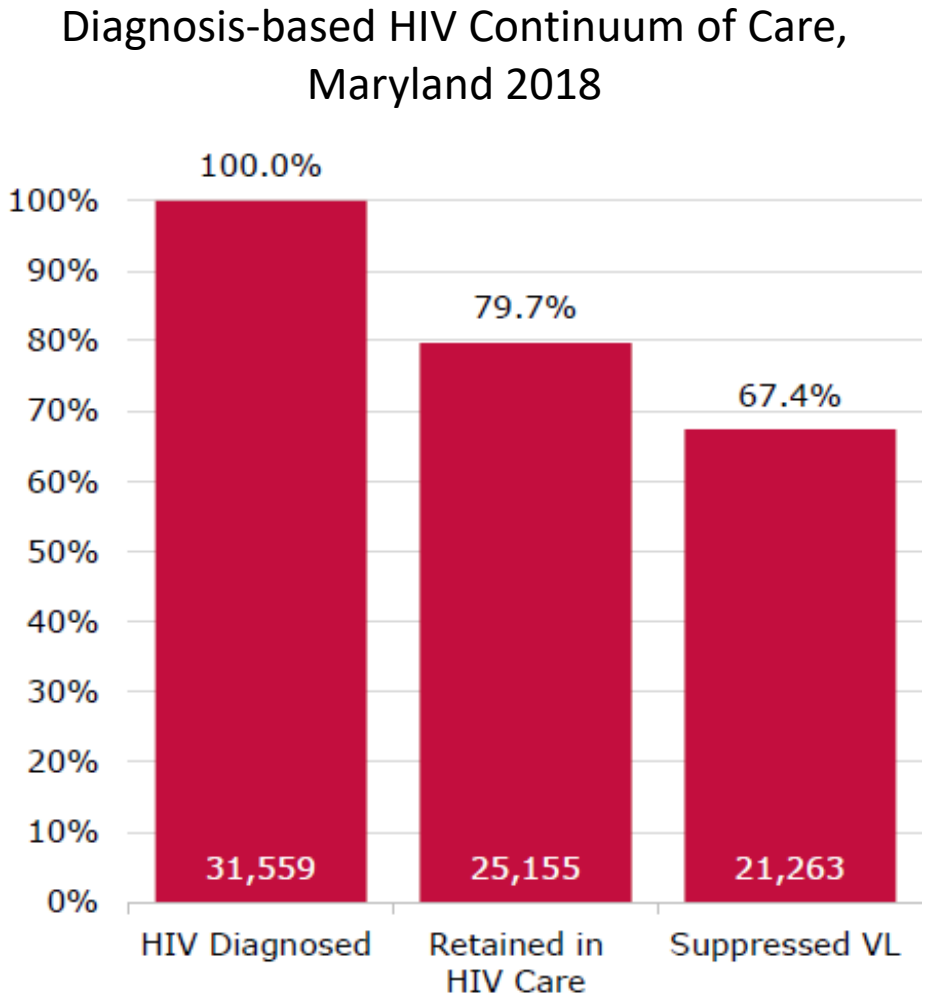
Data-to-Care (D2C)



A public health strategy that uses HIV surveillance and other data to support the HIV Care Continuum, by identifying persons with HIV who are in need of HIV medical care or other services and facilitating linkage to those services

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Cluster Response

- Clusters are a way to target data-to-care (D2C) activities and other services to communities at greatest risk
- Three level response:
  - Cases – link to services, move to viral suppression
  - Contacts – screen for HIV, treat for HIV or provide PrEP
  - Community – identify social networks, provide resources as needed
- Prioritize people in clusters and communities with clusters for interventions

Goals

- For each cluster:
  - 100% contact for partner services and linkage-to-care
  - 100% viral suppression
  - 0% new growth
- Clusters are moved to inactive status after:
  - 100% attempt for partner services/linkage
  - 100% viral suppression or attempt to engage in care
  - 0% new growth in prior six months
- Inactive clusters are passively monitored for growth in size or percent unsuppressed

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Ending the HIV Epidemic

Year	Clusters	Active
2015	6	0 (0%)
2016	6	2 (33%)
2017	4	2 (50%)
2018	14	8 (57%)
2019	18	16 (89%)

As new diagnoses decrease, each cluster of new diagnoses will take on greater importance in identifying and responding to the remaining pockets of HIV transmission

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Integrated HIV Plan: 2018-2022

Vision: Maryland will become a place where new HIV infections are rare …

General Population	Vulnerable Populations	Full Diagnosis of HIV Infection	Care Engagement	Viral Suppression
Educate all Marylanders to heighten HIV awareness and reduce stigma.	***Protect*** individuals and communities at highest risk for HIV infection in Maryland.	***Diagnose*** all Marylanders living with HIV who are unaware of their HIV status.	***Engage*** all Marylanders living with HIV in high quality HIV care.	***Achieve*** viral suppression for all Marylanders living with HIV.

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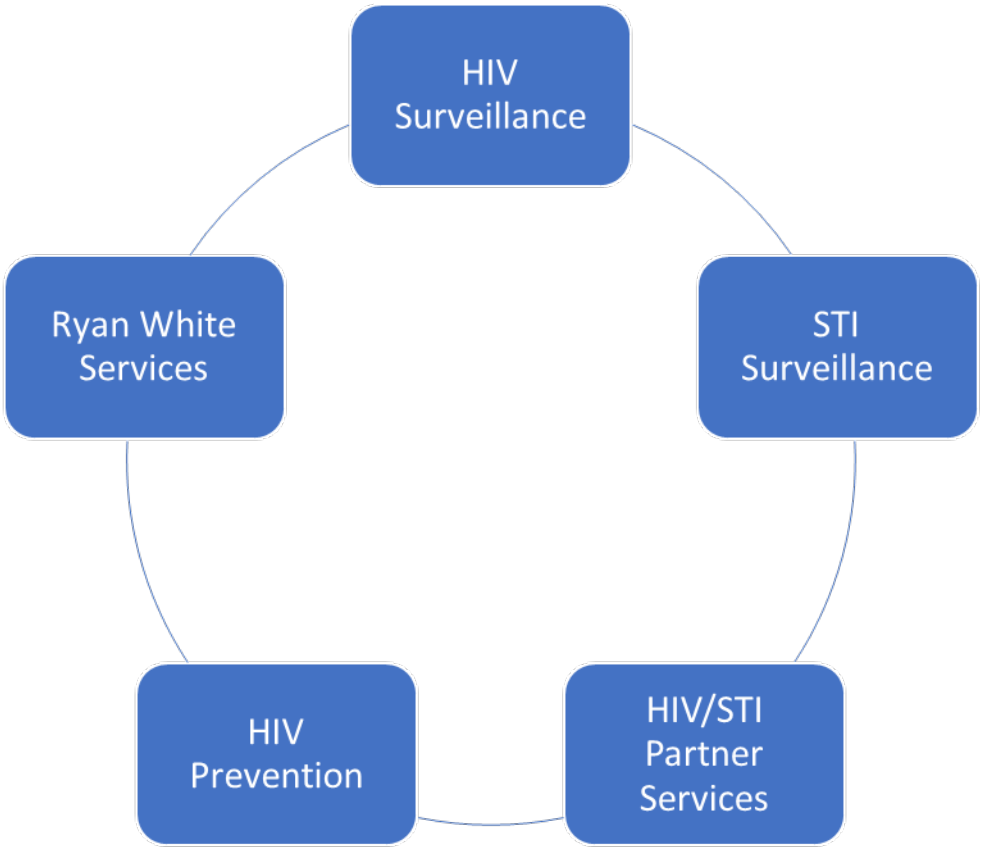
Integrated HIV Cluster Response



- Testing
- PrEP
- Syringe Services
- Partner Services
- Linkage-to-Care
- Medical Care
- ADAP
- Support Services
- D2C
- Treatment Adherence
- Health Education
- Sexual Health
- Drug User Health

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Integrated HIV Cluster Response

- Cluster Detection is generated by HIV Surveillance, but Cluster Response is an integrated team response
- D2C and Cluster Detection and Response are not separate positions or programs
- All of HIV Surveillance supports D2C, HIV Cluster Detection and Response, and Early Intervention Services (EIS)
- HIV Cluster Detection and Response activities are supported by HIV surveillance, HIV prevention, and HIV services funds

Questions and Answers

Contact Information

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