

Molecular HIV Surveillance (SHiNe) Shared HIV Networks

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Presentation Points to Ponder

We need to do better at preventing the spread of HIV in our communities by understanding who is most at risk

What is the draw towards Molecular HIV Surveillance (SHiNe)?

What is a Transmission Cluster and how can we find them?

What is the value and POWER of transmission clusters in targeting our prevention efforts to our most burdened and vulnerable?

What is Time-Space Monitoring?

How do ShiNe and Time-Space Monitoring Intersect?

Understanding Who's at Risk

More than 1 million people **at risk** for HIV infection in the US

- Only 38,500 new infections in 2015

How do we know where to focus prevention efforts?

We know new infections aren't equally distributed

- In Michigan young black men are much more likely to acquire HIV

Some groups have much higher transmission rates

- People within those groups are in what's called a **Transmission Cluster**

Shared HIV Networks

The newest tool we have to detect transmission clusters

- Molecular analysis has been done for other diseases

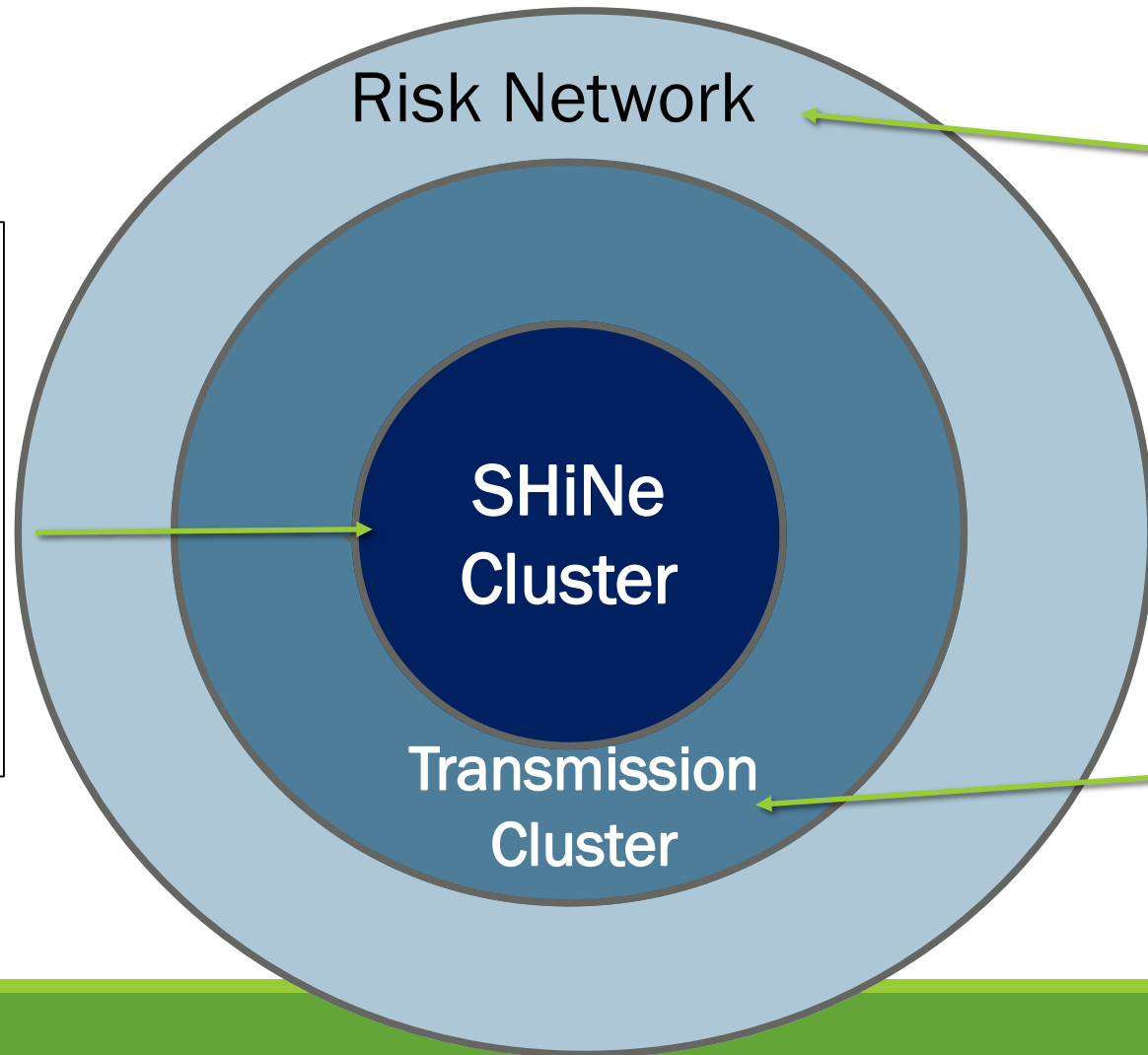
Molecular analysis uses the output from a HIV resistance test to form clusters

HIV resistance tests are a standard of care

- Upon diagnosis
- When changing regimen

These tests are covered by most major insurance providers, just like VLs and CD4s

Big Picture: What a Network Looks Like



Can include persons who:

- Entered care
- Had resistance testing
- Sequences sent to state

Can include persons who:

- At risk of HIV infection
NOT YET INFECTED

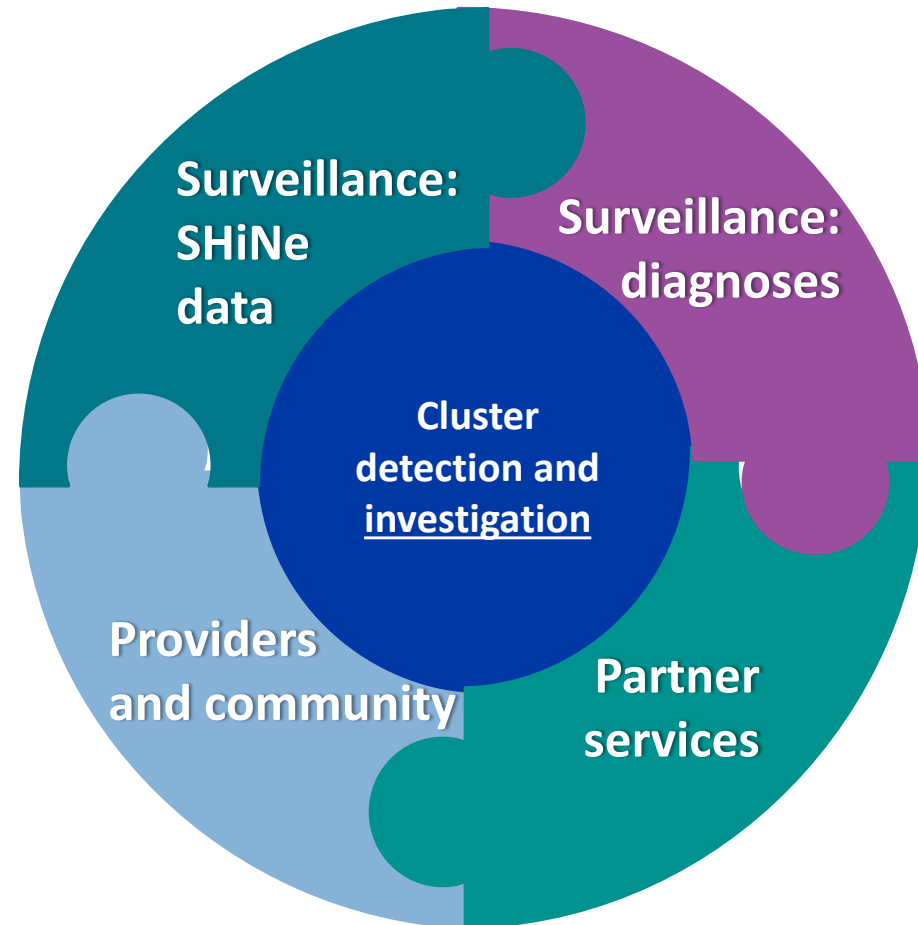
Can include persons who:

- Living with undiagnosed HIV Infection
- Diagnosed but does not have an available genotype sequence

How Can We Detect Transmission Clusters?

Detection of molecular clusters linked by their sequence

Vigilant and involved community members may notice trends



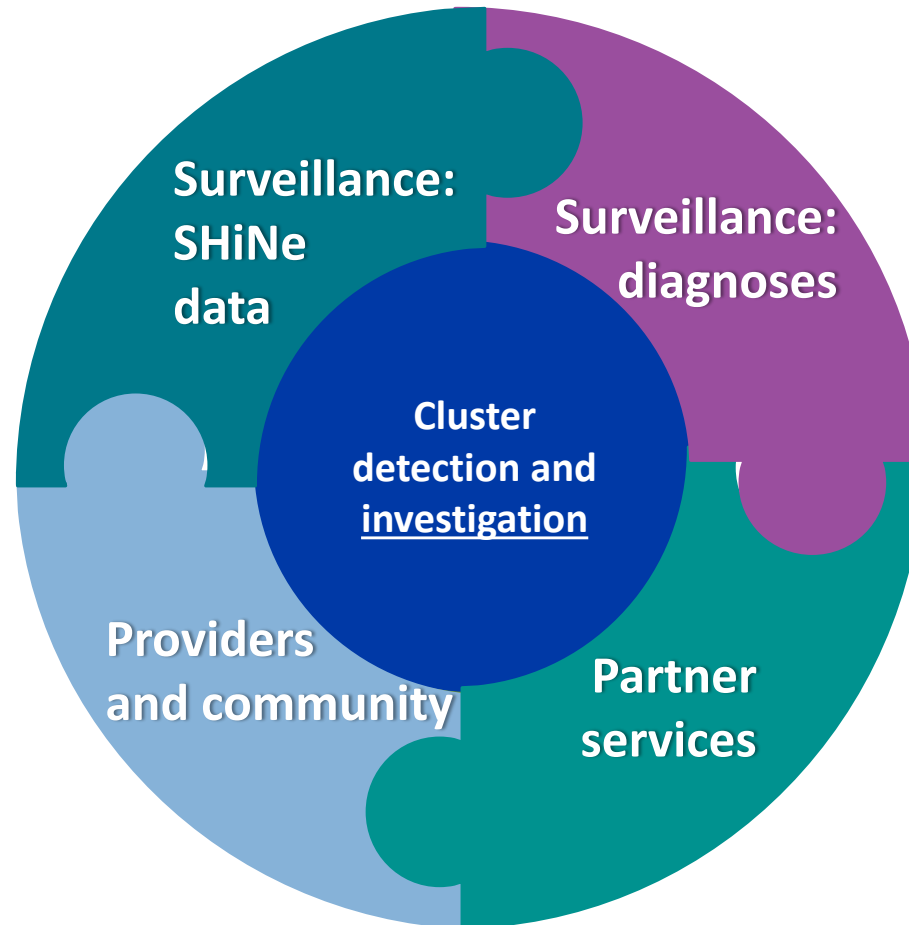
More new cases than normally expected in an area

Clusters formed by named partners during PS interview

Cluster Characterization

Analyze growth and general demographics of cluster

Do providers or the community have insights into prevention needs?



What are the demographic and care characteristics of people in the cluster?

Have people in the cluster received partner services interviews? Did any name each other?

Why Focus on SHiNe Clusters?

They represent fast and recent transmission clusters

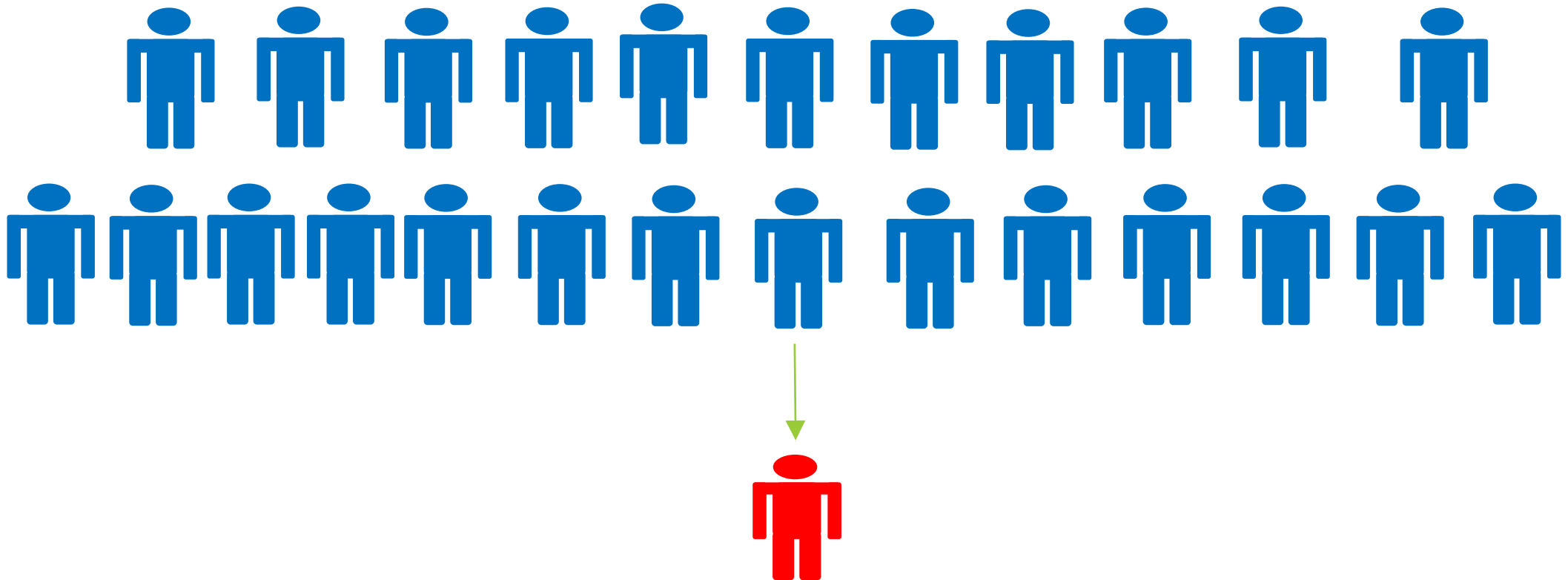
- Tight genetic distance threshold

Further limited to priority clusters

- CDC- 5 person diagnosed within 12 month period

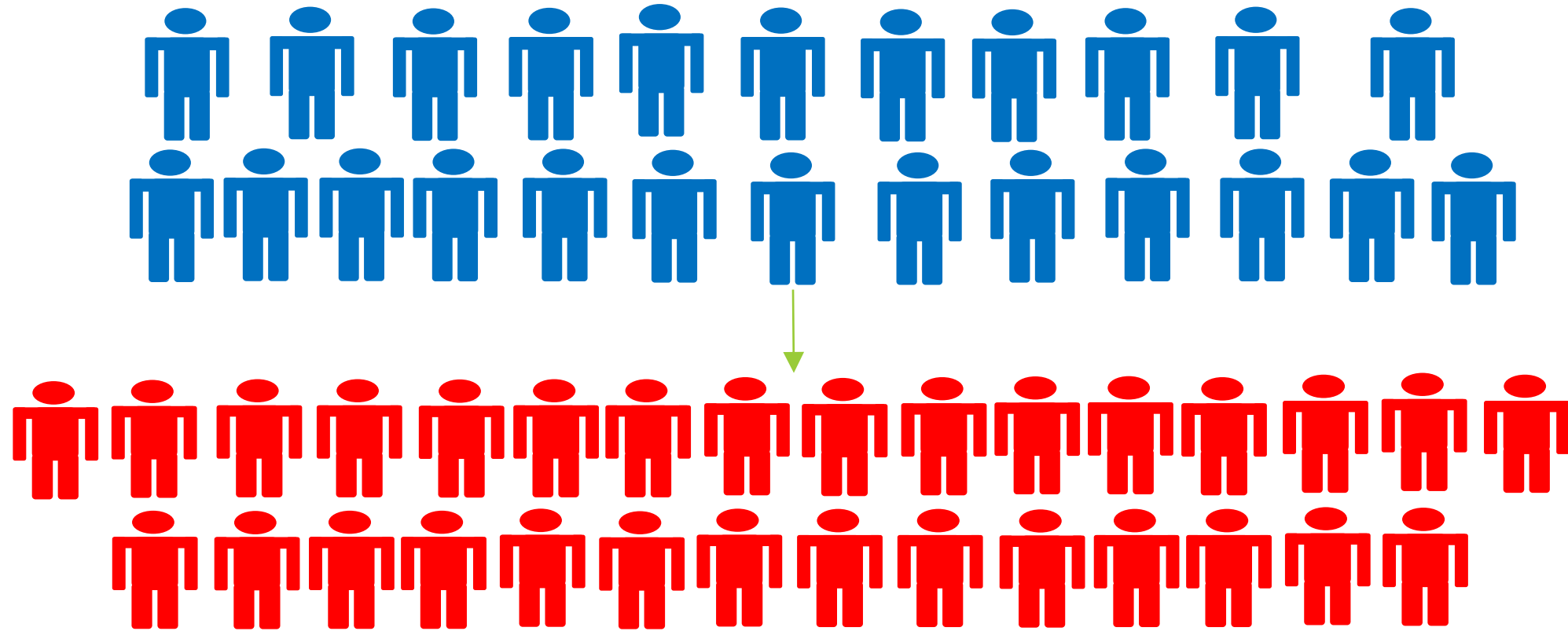
But how do we know these clusters really represent rapid transmission?

HIV Transmission Rate in the United States



4 transmissions per 100 people living with HIV per year

HIV Transmission Rate in Michigan's Fastest Growing Cluster



119 transmission per 100 people living with HIV per year

Michigan's HIV Monitoring Program

SHiNe is one part of a comprehensive strategy for more rapid response to changes in the landscape of the HIV epidemic

Michigan has a comprehensive rapid response plan

- SHiNe analysis
- Time-Space monitoring of incident HIV cases

Standardizing Processes

HIV Response Plan

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graph LR; A[HIV Response Plan] --- B[HIV Time Space Monitoring]; A --- C[SHiNe Monitoring];
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HIV Time Space Monitoring

- Data analyzed monthly, quarterly, & annually
- Triggers built into Response plan

SHiNe Monitoring

- Data analyzed monthly
- Triggers based on CDC guidelines & cluster characteristics

Background

Annual monitoring programs initiated prior Indiana outbreak

- Monthly and quarterly programs began after Indiana outbreak

Programing is based on Western Electric Rules

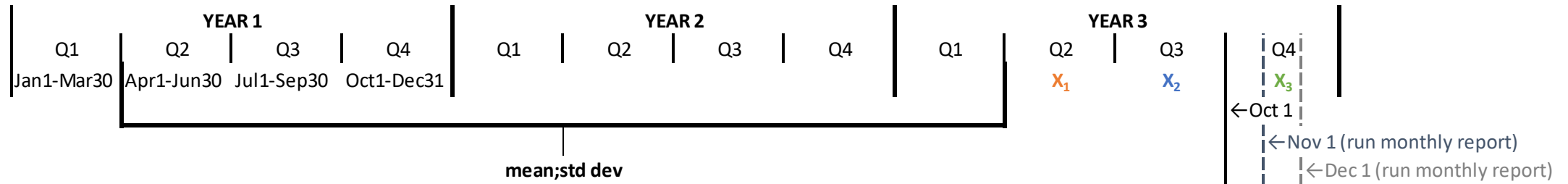
- WER originally used to identify 'out-of-control' events on control charts

Programing compares # of new Dx's to mean # of Dx's from previous time periods

Rules are then established to flag certain regional or demographic groups

- Cities and LHDs
- Prosperity Regions (PR)
 - PR x age group
 - PR x race
 - PR x risk
 - PR x sex

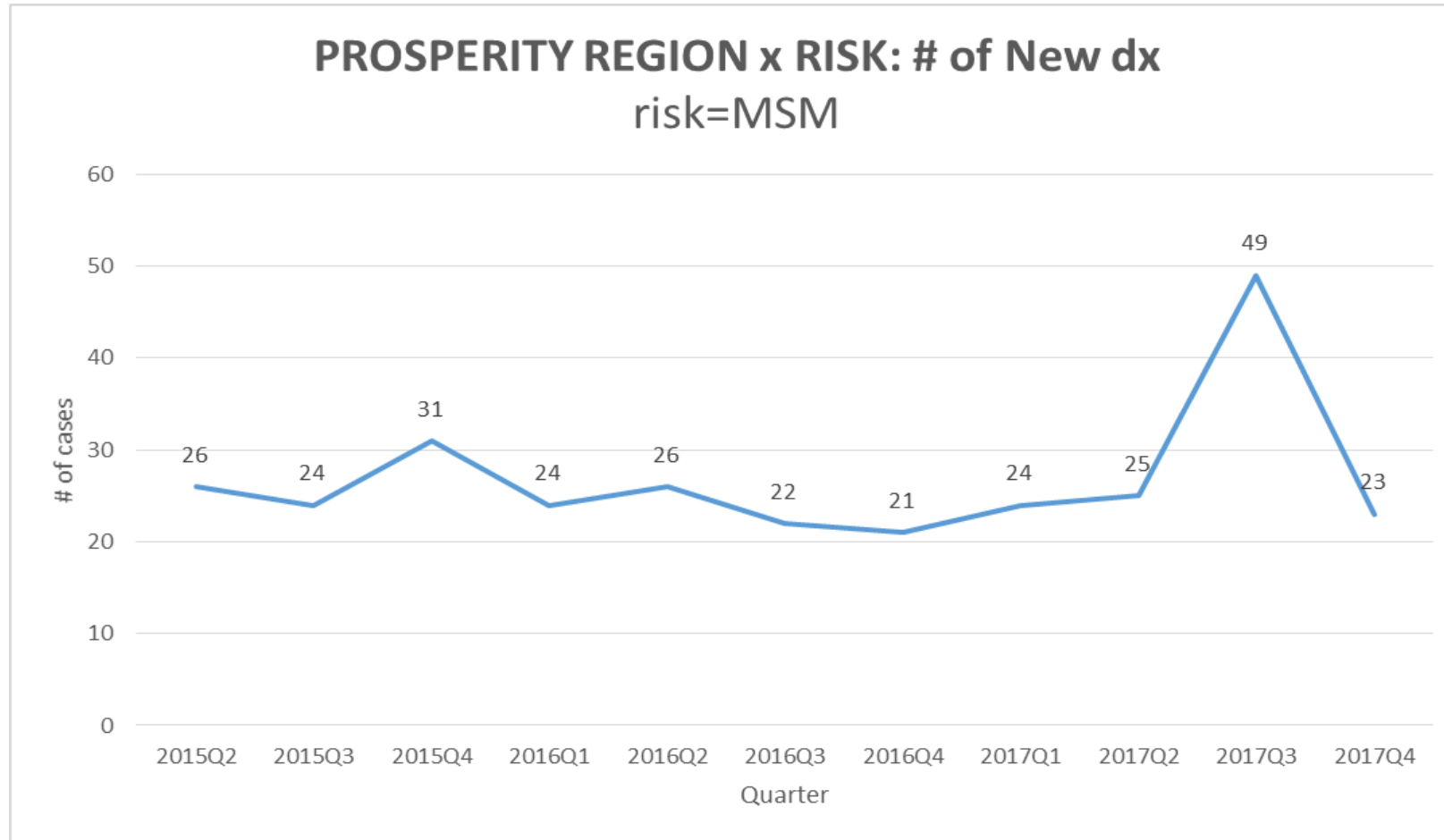
Timeline of Events



Explanation of example Timeline

- Mean of 8 previous quarters is the standard that the most recent 3 quarters are compared to
- Number of new DX in Q2, Q3, and Q4 of year 3 (X_1 , X_2 , and X_3) are individually compared to the mean # of DX occurring between Q2 of year 1 and Q1 of year 3

Example Output



Detroit area: ≥ 1 OF PAST 3Qs $> 3\text{STDDEV}$

Monitoring Phases

Phase-based response plan

Each phase has its own:

- Indicator/elevation criteria
- Surveillance actions
- Prevention actions
- Local health department actions

Phase Overview

Phase 0

- Indicated by unusual, but not large, increase in HIV dx or SHiNe clusters
- Actions- jurisdictions monitored and data shared with prevention

Phase 1

- Indicated by specific increase in new DX or recent and rapid SHiNe clusters
- Actions- regional epis, LHD, managers, and STD epi's notified and data shared. New Dx are monitored, increased testing, and enhance linkage/care activities

Phase 2

- Indicated by consistent phase 1 level Dxs over 3 consecutive quarters
- Actions contact regional health officer and increase testing, care linkage, provide additional funds to supplement prevention and care activities

Phase Overview

Phase 3

- Indicated by further increase in new DX or sustained growth of SHiNe cluster
- In addition to previous personnel notification CHECC officer, MDHHS emergency coordinators and CDC project officers are notified. Same activities as phase 2 but with increased personnel/attention

Phase 4

- Indicated by uncontrolled growth of dx in phase 3 investigation
- Continue to stay in contact with CDC and involve MDHHS executive leadership same activities as phase 3 with additional activities depending on the situation

The Intersection of SHiNe and Time-Space Monitoring
