

# A Framework for Automated Continuum of Care Reporting of Selected Notifiable Diseases using Electronic Medical Record Data: Preliminary Data for HIV in Massachusetts

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DEPARTMENT OF POPULATION MEDICINE



# Objective

Describe the Massachusetts system for using electronic medical records to automatically submit case reports for notifiable diseases, and

Evaluate the enhancement of electronic case reporting to provide longitudinal surveillance throughout the HIV continuum of care.

- ❑ Case identification using EHR data
- ❑ Development of longitudinal case reporting
- ❑ Current status and challenges
- ❑ Preliminary HIV care continuum data

# ESP – EHR Support for Public Health

Software and architecture to extract, analyze, and transmit electronic health information from providers to public health

- ❑ Surveys codified EHR data for patients with conditions of public health interest
- ❑ Generates secure electronic reports for the state health department
- ❑ Designed to be compatible with any EHR system

*JAMIA* 2009;16:18-24

*MMWR* 2008;57:372-375

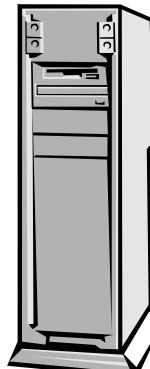
*Am J Pub Health* 2012;102:S325–S332

# ESP: Automated disease detection and reporting for public health

Practice EMR's



ESP Server



Health Department



diagnoses



lab results



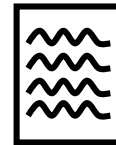
meds



vital signs



demographics



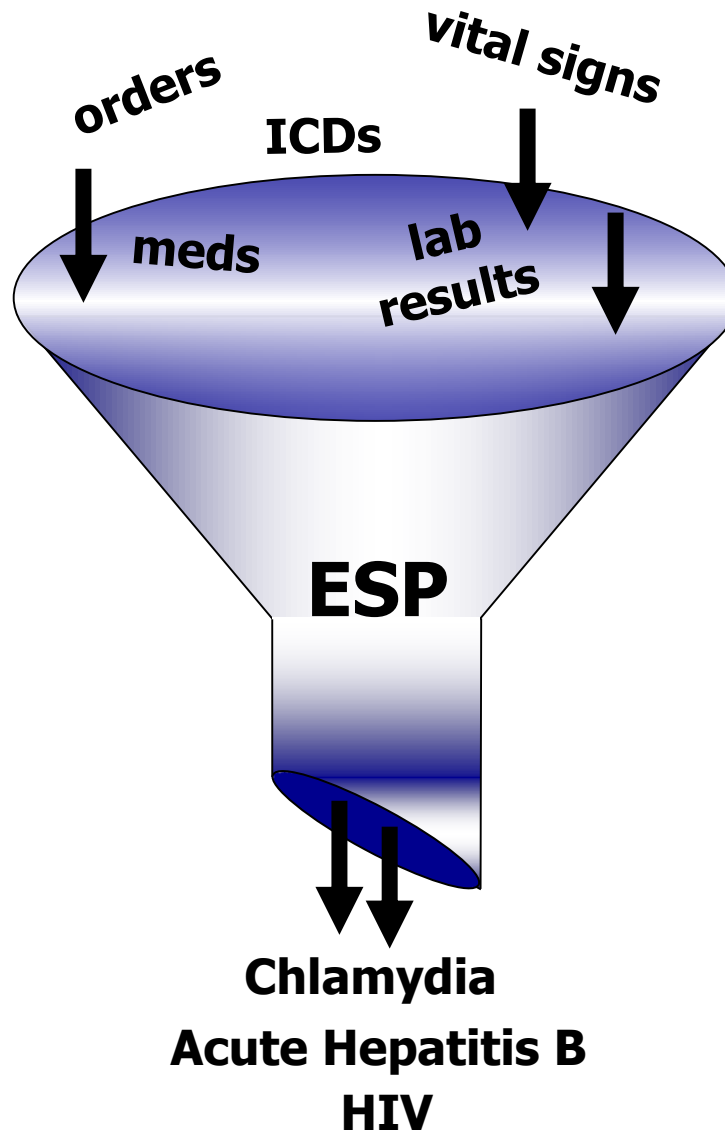
Notifiable  
disease  
case reports

JAMIA 2009;16:18-24

Am J Public Health 2012;102:S325-S332

Am J Public Health 2014;104:2265-2270

# Case Identification



# HIV Case Detection Algorithm

## Any of the following:

- Positive Western Blot
- Positive HIV Antigen/Antibody test and positive HIV ELISA
- HIV RNA Viral Load > 200 copies/mL
- HIV Qualitative PCR
- $\geq 2$  ICD codes for HIV and history of prescription for  $\geq 3$  HIV meds ever
- HIV on problem list and history of prescription for  $\geq 3$  HIV meds ever
- Concurrent prescriptions for 2 sets of 3 or more *different* antiretrovirals at least 1 month apart

PPV: 100.0% (95% CI: 98.5, 100.0); Sensitivity: 94.2% (90.5, 96.7).

# Supplemental data provided with ESP case reports

- Patient demographics
  - Age, Race/Ethnicity, Address, etc.
- Provider information
- Pregnancy status
- Symptoms
- Treatment information

# ESP Notifiable Condition Case Reporting\*

- Chlamydia
- Gonorrhea
- Acute Hepatitis A
- Acute Hepatitis B
- Acute Hepatitis C
- Chronic Hepatitis C
- HIV
- Influenza-like Illness
- Lyme
- Pertussis
- Syphilis
- Active Tuberculosis
- Latent Tuberculosis Infection

\*Diseases are in varying stages of implementation



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# Longitudinal Case Reporting

- Report initial case
  - Including supplemental data from EHR
- Follow patients throughout the continuum of care
  - Monitor disease progression
  - Identify patients potentially out of care
  - Monitor health outcomes

# Prospective HIV Surveillance

- Serial lab results
  - e.g., CD4 and HIV viral load test results
- Medical care visits
- New prescriptions
- Opportunistic infections
- Changes to pregnancy status
- *Future expansion planned for screening, referrals, and care coordination*

# Challenges

- Identification of certain risk factors for HIV using EMR data
  - *Sexual orientation, transgender status, intravenous drug use, country of origin*
- Validation/QC of new data elements reported from the EMR
  - *Housing status, HIV care visit*
- Ongoing lab mapping maintenance
- Identification of indicators of “in care” status
  - *serial CD4 and HIV viral load test results, antiretroviral prescriptions, encounters associated with HIV or an opportunistic infection*

# Current Status for HIV Reporting

- Algorithm validation:
  - Performed at 1 multi-site practice and 2 individual health centers
  - In progress for 2 additional health centers
  - Planned for 1 additional multi-site practice and several health centers
- In final stages of testing
- Expect longitudinal HIV case reporting to begin for at least 2 health centers this summer

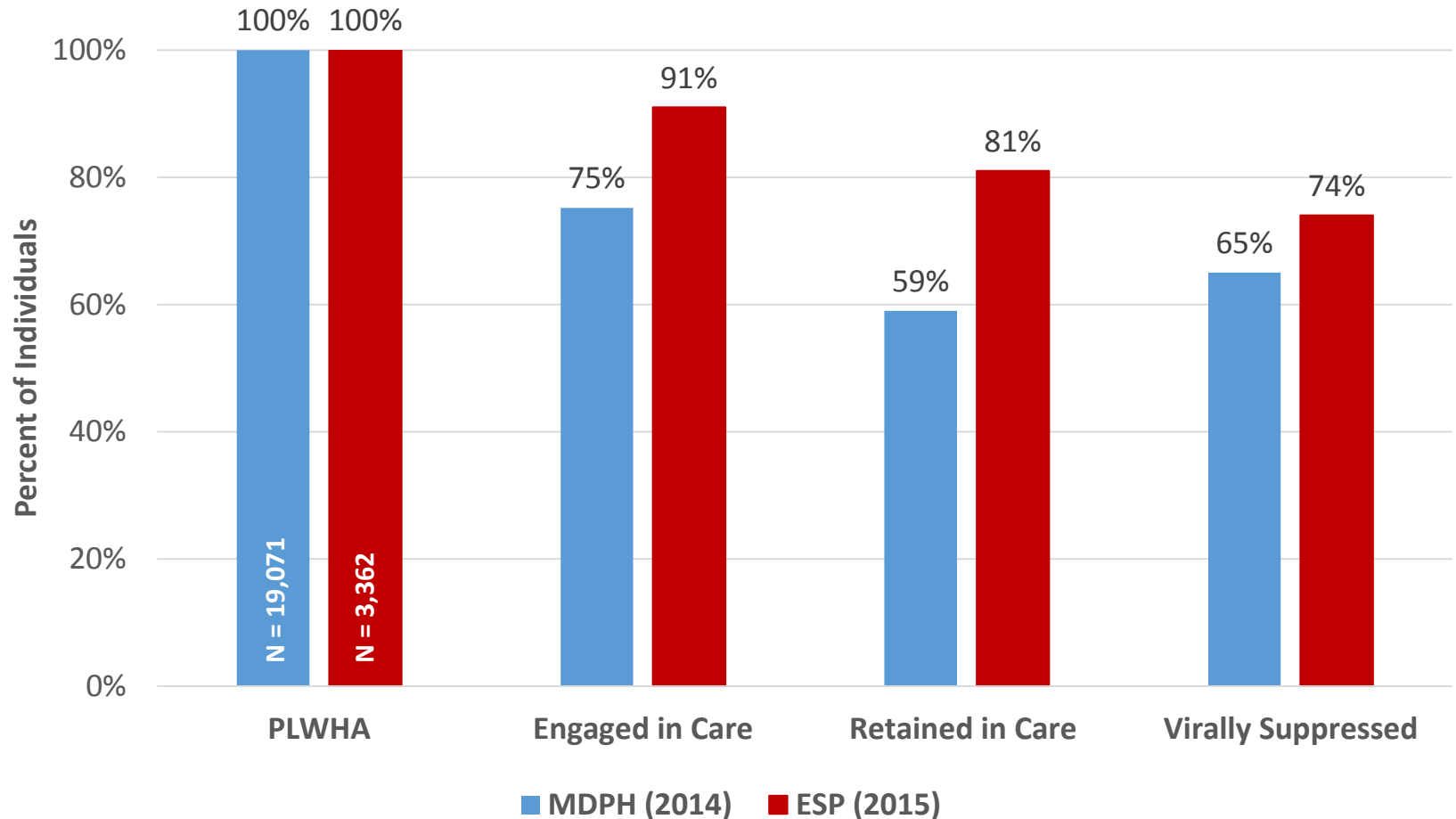
# Preliminary HIV Care Continuum Data

- ESP has capability to provide population-level aggregate summaries
- Included data from:
  - 18 community health centers in Massachusetts
  - Atrius Health, multisite ambulatory practice group
- Identified HIV patients in care in 2015
- Evaluated proportion receiving HIV care

# Preliminary HIV Care Continuum Data

Care Continuum	Percent
HIV patients in care in 2015 (N=3,362)	
Follow-up encounter	97%
Follow-up encounter with HIV diagnosis code	88%
Patients prescribed HIV medications	87%
Retained in care	81%
Patients with a viral load test	71%
Patients with a viral load test and prescribed HIV medications	68%
Virally suppressed	63%
Virally suppressed and on medications	60%
Opportunistic Infection	3%

# Comparison to Massachusetts Surveillance Data





# Continuity of Care in RiskScape

RiskScape



- Dashboard
- Pick Conditions
- Map
- Demographics & Comorbidities
- Timeseries
- Continuity of Care
- Condition Definitions
- About MDPHnet
- 

Site	First Year in ESP	Age Group	Birth Cohort	Sex	Race/Ethnicity
All	All	All	All	All	All
<a href="#">Update Table</a>		<a href="#">Reset</a>			

Hepatitis C	Count	Percent
Total Population Under Surveillance ⓘ	1674514	100%
Patients tested for hepatitis C ⓘ	212233	12.7%
Patients with a positive result (RNA or ELISA) ⓘ	5779	2.7%
Patients with a viral load (any result, any time frame) ⓘ	4677	80.9%
Most recent viral load positive ⓘ	2200	38.1%
Acute hepatitis C ⓘ	220	3.8%
Resolved, no treatment ⓘ	23	10.5%
Persistently infected ⓘ	32	14.5%
Unknown status ⓘ	83	37.7%
Chronic hepatitis C ⓘ	5674	98.2%
Never on treatment ⓘ	4597	81.0%
Resolved ⓘ	793	17.3%
Persistently infected ⓘ	1818	39.5%
Unknown status ⓘ	1091	23.7%
Received treatment ⓘ	1077	19.0%
Last viral load undetectable ⓘ	145	13.5%
Sustained virological response ⓘ	36	3.3%
Unknown status ⓘ	205	19.0%

# Coupling Surveillance and EHR Data

## Limitations of EHR data alone

- Not all data elements of interest are systematically captured in EHR
- Patients may get some of their HIV care (e.g., lab testing) outside of ESP partner practices

## Limitations of traditional surveillance data alone

- Burden on providers and MDPH to report and monitor cases
- With the exception of lab results, cannot easily capture care continuum data longitudinally

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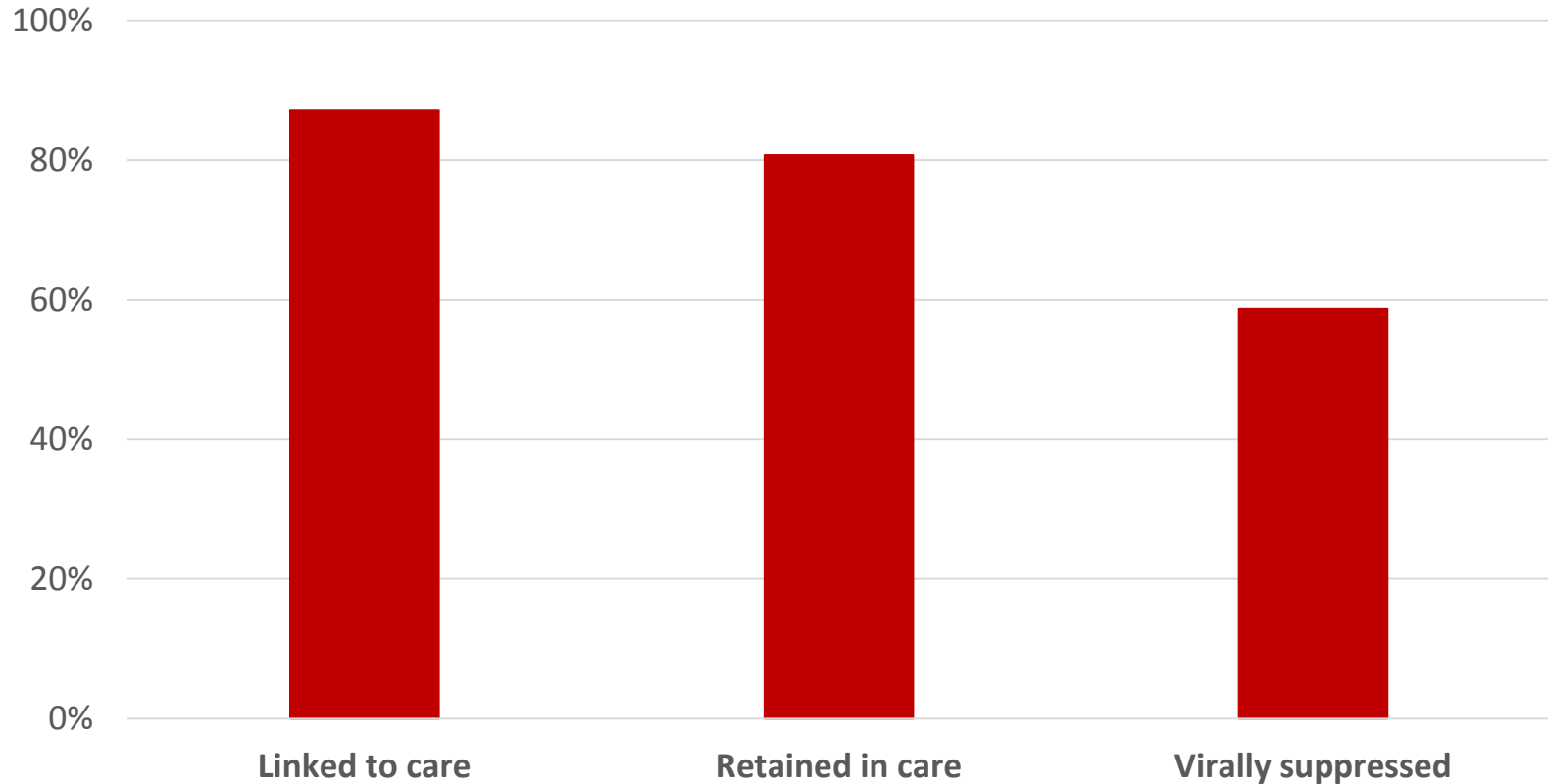
Extra Slides

# Implementation Process

- Create HIV case detection algorithm
- Validate algorithm against medical charts and MAVEN
- Identify additional data elements and evaluate for accuracy and completeness
- Map data elements to standardized identifiers, such as LOINC and SNOMED codes
- Transmit data to MDPH's Health Information Reporting Portal via encrypted HL7 messages
- Integrate data into MAVEN upon initial detection and prospectively
  - Enhance MAVEN to accept all EMR data elements of interest
- Create new data triage workflows

# Preliminary Data – New HIV Patients

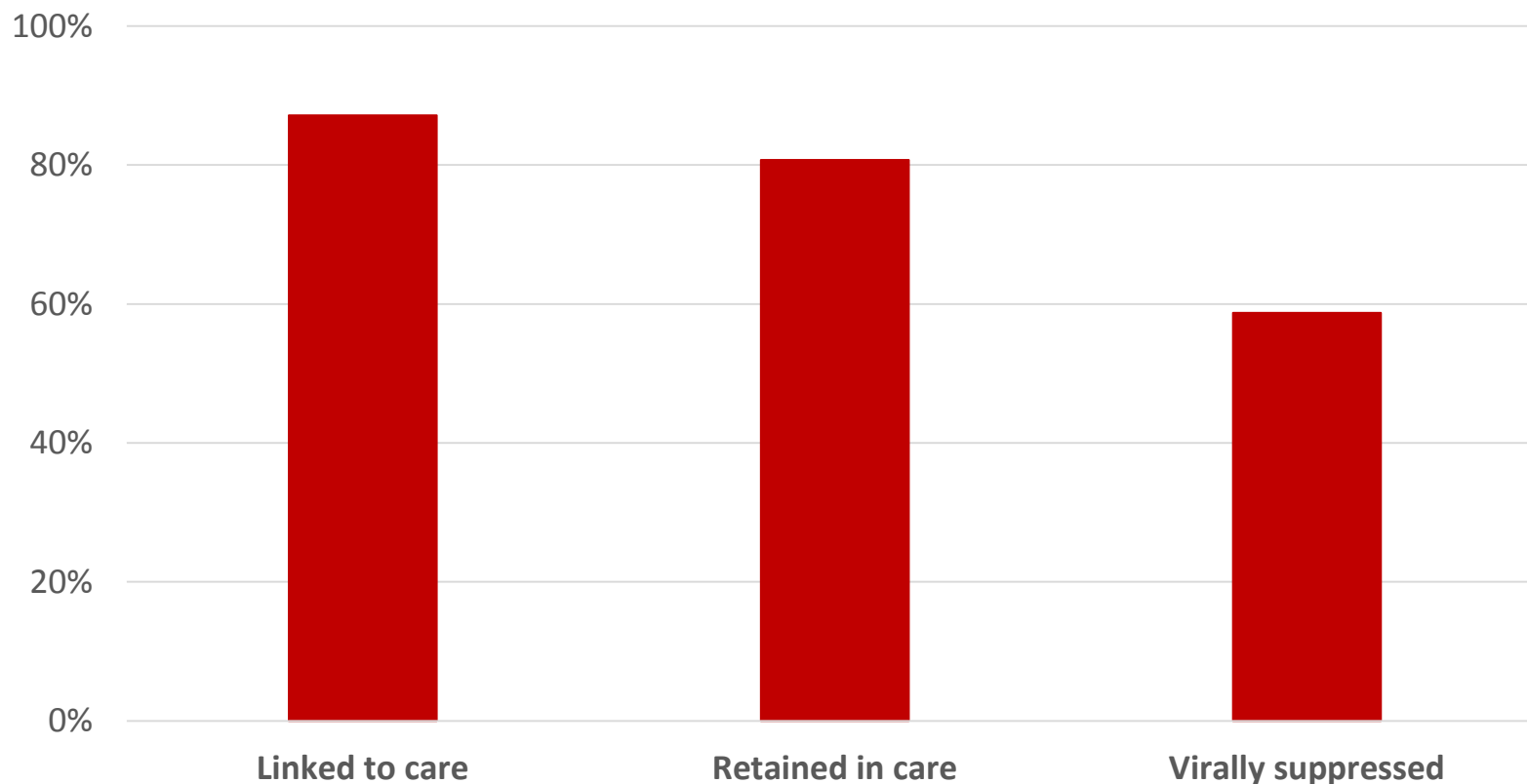
Percent of Patients Newly Diagnosed with HIV in 2015



109 patients newly diagnosed with HIV

# Preliminary Data – New HIV Patients

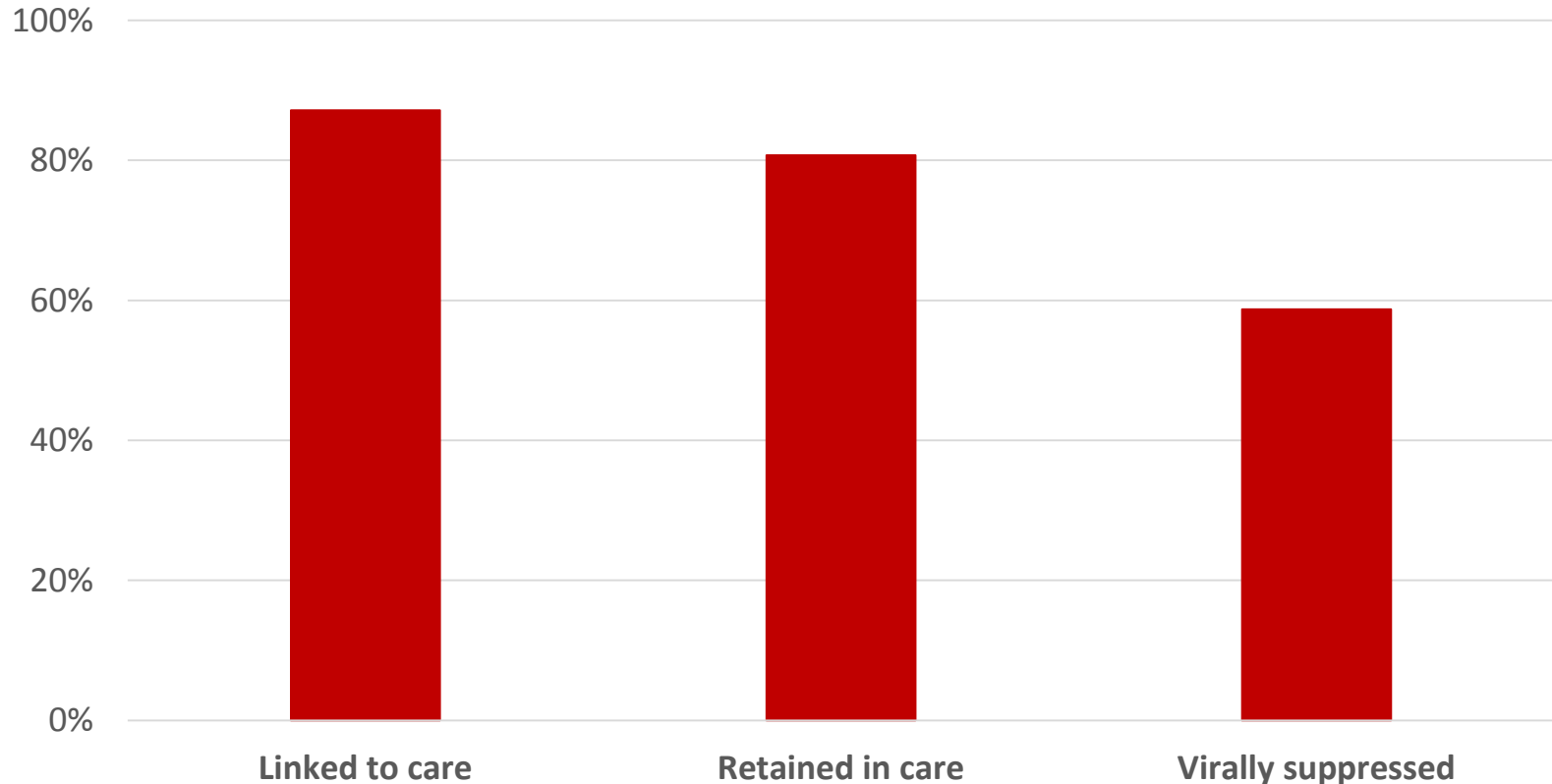
Percent of Patients Newly Diagnosed with HIV in 2015



**Linked to care:** Patients diagnosed with HIV in 2015 who had at least one viral load, CD4 test, or HIV prescription within 90 days of diagnosis

# Preliminary Data – New HIV Patients

Percent of Patients Newly Diagnosed with HIV in 2015

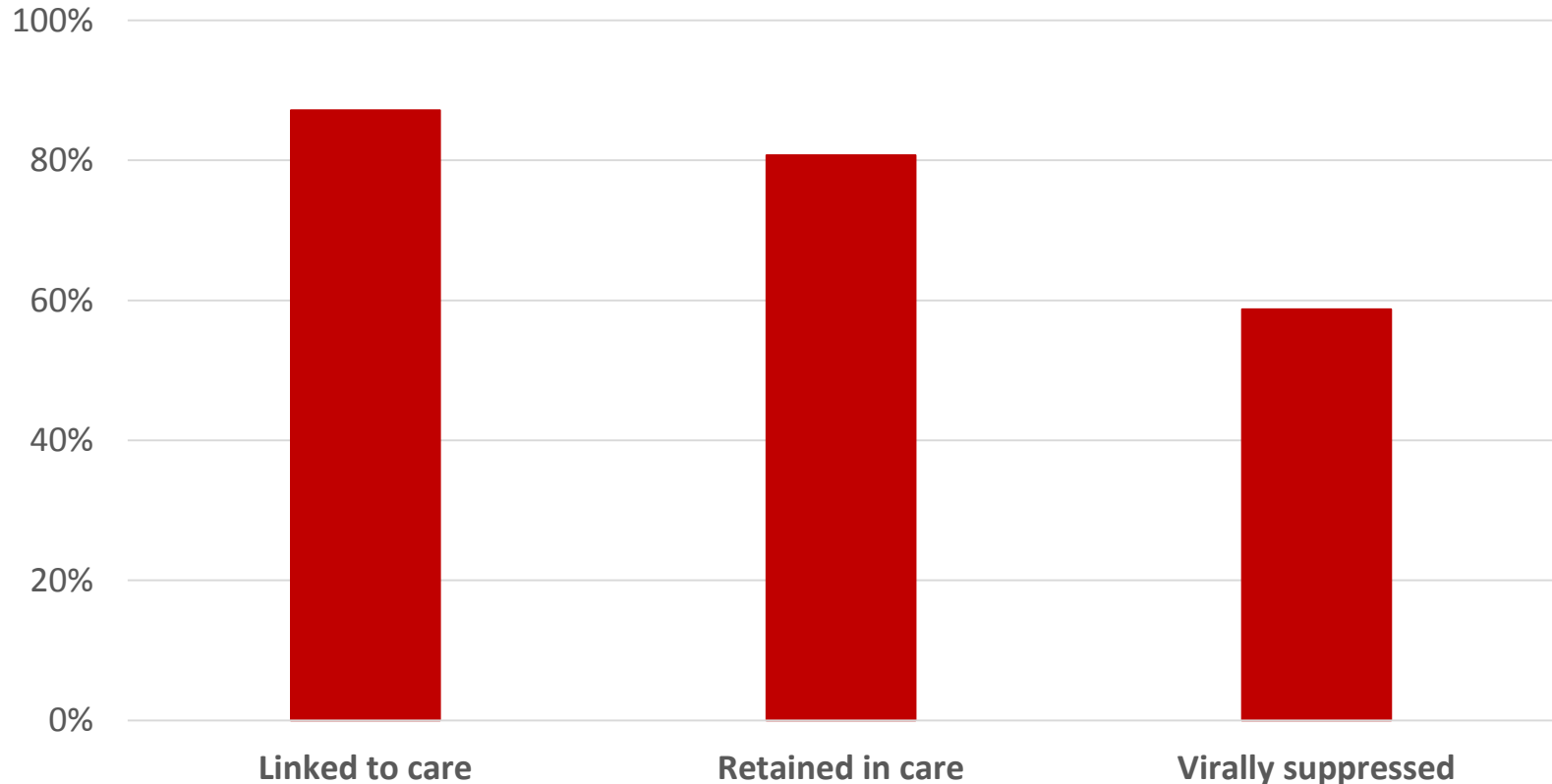


**Retained in care:** New HIV patients who had at least one of the following in two different years following case date: viral load test, CD4+ test, encounter with an HIV diagnosis, or medications prescribed.



# Preliminary Data – New HIV Patients

Percent of Patients Newly Diagnosed with HIV in 2015



**Virally suppressed:** New HIV patients whose most recent HIV viral load was less than 200 copies/mL.

# Comparison to Ryan White HIV/AIDS Massachusetts State Profile

- **Viral suppression** is the percentage of people living with HIV whose last viral load result of <200 copies/mL among patient with:
  - at least one outpatient visit during the calendar year
  - at least one viral load reported
- Via ESP, **88.3%** of HIV patients in care in 2015 achieved viral suppression.
- In 2014, **88.6%** of Ryan White HIV/AIDS Program clients in Massachusetts achieved viral suppression (HRSA).

# Comparison to Ryan White HIV/AIDS Massachusetts State Profile

- **Retention in care** is the percentage of PLWH who had at least one outpatient visit by September 1 of the calendar year, with a second visit at least 90 days after.
  - Among patients with an outpatient visit before September 1<sup>st</sup>
- Via ESP, **93.8%** of HIV patients in care in 2015 were retained in care.
- In 2014, **86.1%** of Ryan White HIV/AIDS Program clients in Massachusetts were retained in care (HRSA).