Creating Hepatitis C Care Cascades from Laboratory and Electronic Health Record Data

Indian Country Hepatitis C Elimination ECHO

June 8, 2021

Division of Viral Hepatitis
Centers for Disease Control and Prevention

Disclaimer/Disclosures

- This presentation does not necessarily reflect the official policies of the Centers for Disease Control and Prevention.

- Nathan Furukawa: Nothing to Disclose
- Liesl Hagan: Nothing to Disclose
- Martha Montgomery: Nothing to Disclose
- Priti Patel: Nothing to Disclose

Division of Viral Hepatitis: Strategy and Implementation Unit

Mission:

- Develop public health policies, partnerships, and initiatives to improve access to viral hepatitis prevention and treatment with a focus on populations with disproportionate burden of disease.
- Improve the awareness and implementation of CDC recommendations on hepatitis C elimination

Disproportionately Affected Populations:

- People who inject drugs
- People in correctional settings
- American Indian/Alaska Native people

Activities Include:

- National Harm Reduction Technical Assistance Center
- Developing HCV elimination strategic planning guidance for state health departments
- Developing DVH's perinatal HCV prevention strategy
- Supporting hepatitis C elimination projects among Alaskan Native tribes

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Overview

- **Laboratory-based Hepatitis C Virus Clearance Cascade**
  - Martha Montgomery
- **Creating a Standardized EHR-based Care Cascade for Hepatitis C**
  - Liesl Hagan
- **Discussion and Q/A**

Laboratory-based Hepatitis C Virus Clearance Cascade

Guidance for State and Local Health Departments

A work in progress

Martha Montgomery, MD, MHS

Purpose

- **Create a standardized hepatitis C virus clearance cascade based on laboratory reporting**
- **Provide jurisdictions with a tool to assist in hepatitis C elimination by**
  - Identifying data-to-care opportunities
  - Measuring impact of public health interventions
  - Evaluating health disparities within subpopulations

Development Process

RESEARCH ARTICLE

Low hepatitis C antibody screening rates among an insured population of Tennessean Baby Boomers

James G. Carlucci[1,2], Syeda A. Farooq[1], Lindsey Sizemore[2], Michael Rickles[2], Brandon Cosley[3], Leigh McCormack[3], Carolyn Wester[2]*

1 Vanderbilt University Medical Center, Nashville, Tennessee, United Sta
Department of Health, Nashville, Tennessee, United States of America, 3
Chattanooga, Tennessee, United States of America

Research Full Report

SDC

Development and Validation of Surveillance-Based Algorithms to Estimate Hepatitis C Treatment and Cure in New York City

Miranda S. Moore, MPH; Angelica Bocour, MPH; Lizeyka Jordan, MPH; Emily McGibbon, MPH; Jay K. Varma, MD; Ann Winters, MD; Fabienne Laraque, MD, MPH

Sharing the cure: Building primary care and public health infrastructure to improve the hepatitis C care continuum in Maryland

Risha Irvin[1] | Boatemaa Ntiri-Reid[2] | Mary Kleinman[2] | Tracy Agee[1] | Jeffrey Hitt[2] | Onyeka Anaedozie[2] | Tolu Arowolo[2] | Hope Cassidy-Stewart[2] | CaSaundra Bush[2] | Lucy E. Wilson[2] | Alexander J. Millman[3] | Noele P. Nelson[3] | Lauren Canary[3] | Sherilyn Brinkley[1] | Juhi Moon[1] | Oluwaseun Falade-Nwulia[1] | Mark S. Sulkowski[1] | David L. Thomas[1] | Michael T. Melia[1]

The Massachusetts Hepatitis C Testing Cascade, 2014-2016

Quynh T Vo, Shauna Onofrey, Daniel Church, Kevin Cranston, Alfred DeMaria and R Monina Klevens

Bureau of Infectious Disease and Laboratory Sciences, Massachusetts Department of Public Health, Boston, MA, USA.

Detection of Recurrent Hepatitis C Viremia Using Surveillance Data, New York City

Kevin Guerra, MPH; Angelica Bocour, MPH; Miranda S. Moore, MPH; Ann Winters, MD

Tennessee's 2017 Hepatitis C Virus Continuum of Cure

Council of State and Territorial Epidemiologists Annual Conference, 2019

Lindsey Sizemore, Viral Hepatitis Program Director

A Population-Based Intervention to Improve Care Cascades of Patients With Hepatitis C Virus Infection

John Scott,[1] Meaghan Fagalde,[2] Atar Baer,[2] Sara Glick,[1,2] Elizabeth Barash,[2] Hilary Armstrong,[2] Kris V. Kowdley,[3] Matthew R. Golden,[1,2] Alexander J. Millman,[4] Noele P. Nelson,[4] Lauren Canary,[4] Matthew Messerschmidt,[5] Pallavi Patel,[6] Michael Ninburg,[7] and Jeff Duchin[1,2]

Public health clinic-based hepatitis C testing and linkage to care in baltimore

O. Falade-Nwulia,[1,2] S. H. Mehta,[3] J. Lasola,[1] C. Latkin,[3] A. Niculescu,[1,2] C. O'Connor,[3] P. Chaulk,[2,3] K. Ghanem,[1] K. R. Page,[1,2] M. S. Sulkowski[1] and D. L. Thomas[1] [1]*Johns Hopkins University School of Medicine, Baltimore, MD, USA;* [2]*Baltimore City Health Department, Baltimore, MD, USA; and* [3]*Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA*

Minimum requirements

- Deduplicated hepatitis C database that houses laboratory data
- Reporting of negative (not detected) HCV RNA test results in addition to positive anti-HCV and positive (detected) HCV RNA
- Laboratory reporting should include type of test, test result, specimen collection date

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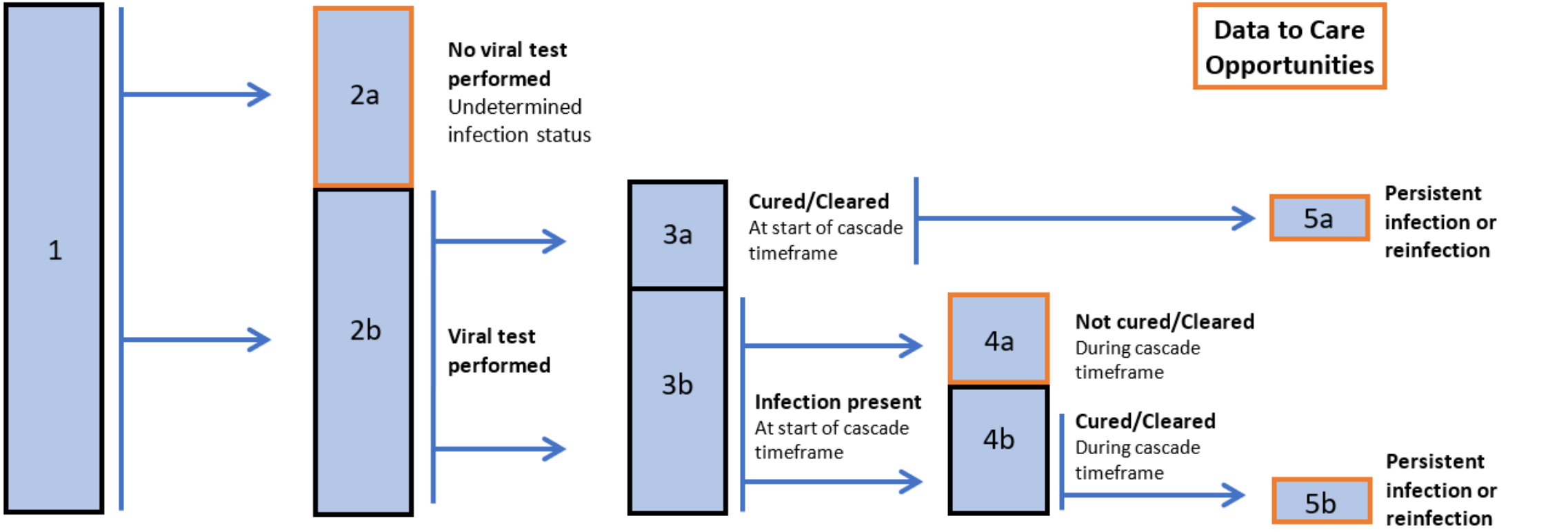
Lab-based Hepatitis C Virus Clearance Cascade



1. Ever infected

Any reported anti-HCV+, RNA+, detectable genotype, or Ag+ during ever infected period

2. Viral testing

2a. No viral test reported during follow-up period

2b. Any viral test reported during follow-up period

3. Initial infection

3a. Initial reported viral test (-) during follow-up period

3b. Initial reported viral test (+) during follow-up period

4. Cured or cleared

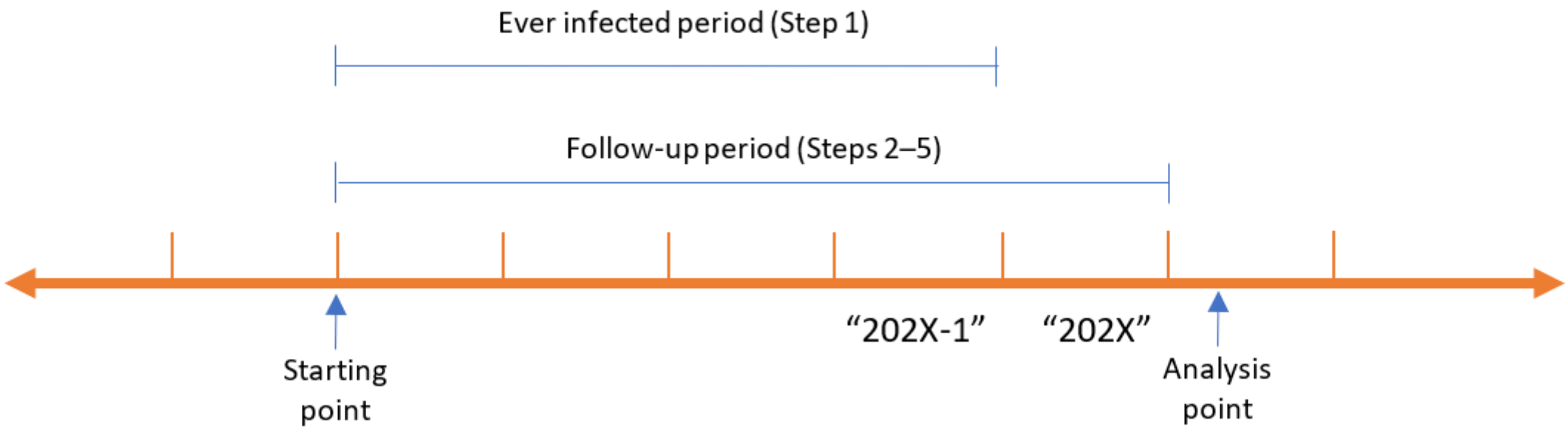
4a. All reported viral test(s) (+) during follow-up period

4b. Any reported viral test (-) after initial viral test (+) during follow-up period

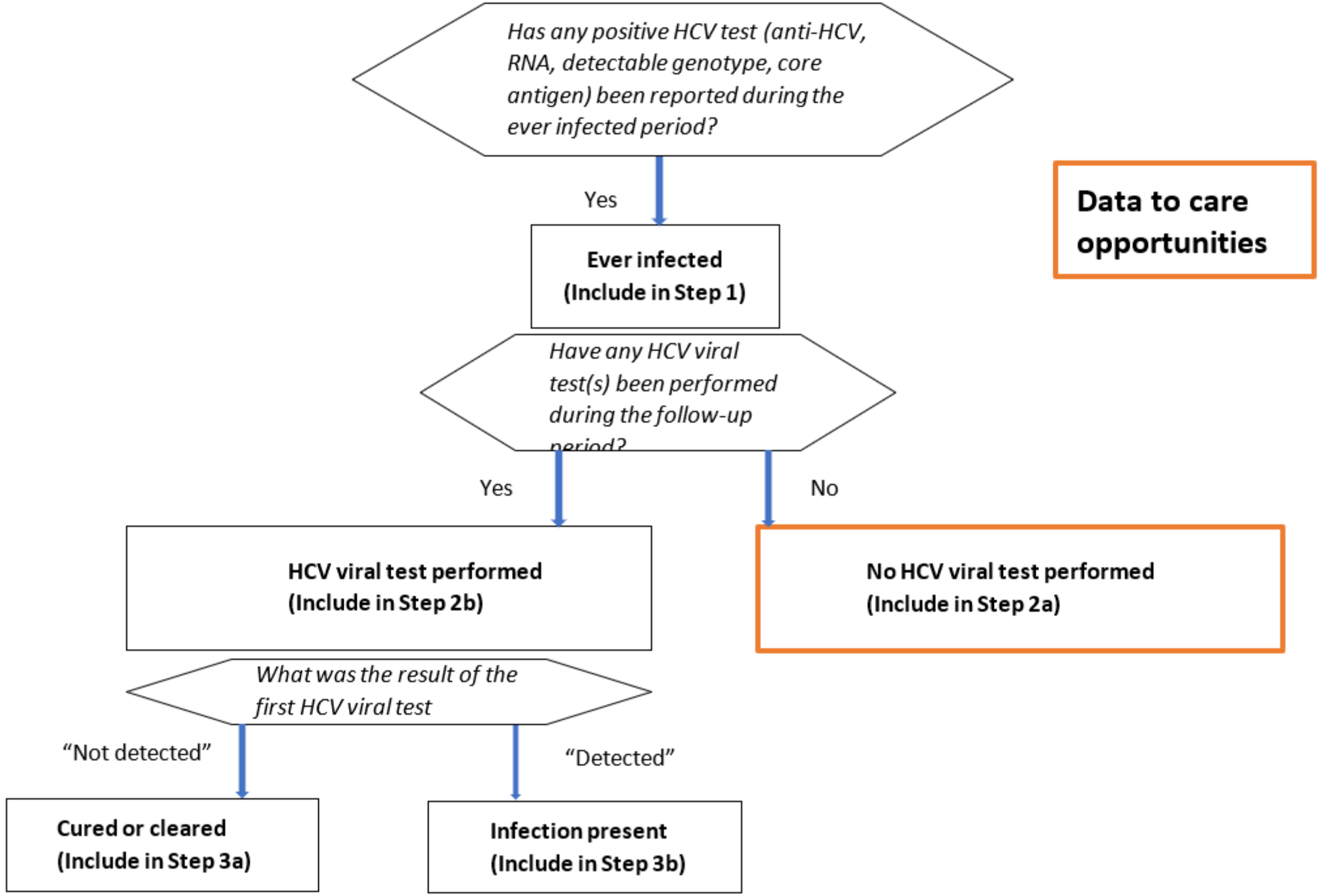
5. Persistent infection or reinfection

Any viral test (+) after previous viral test (-) during follow-up period

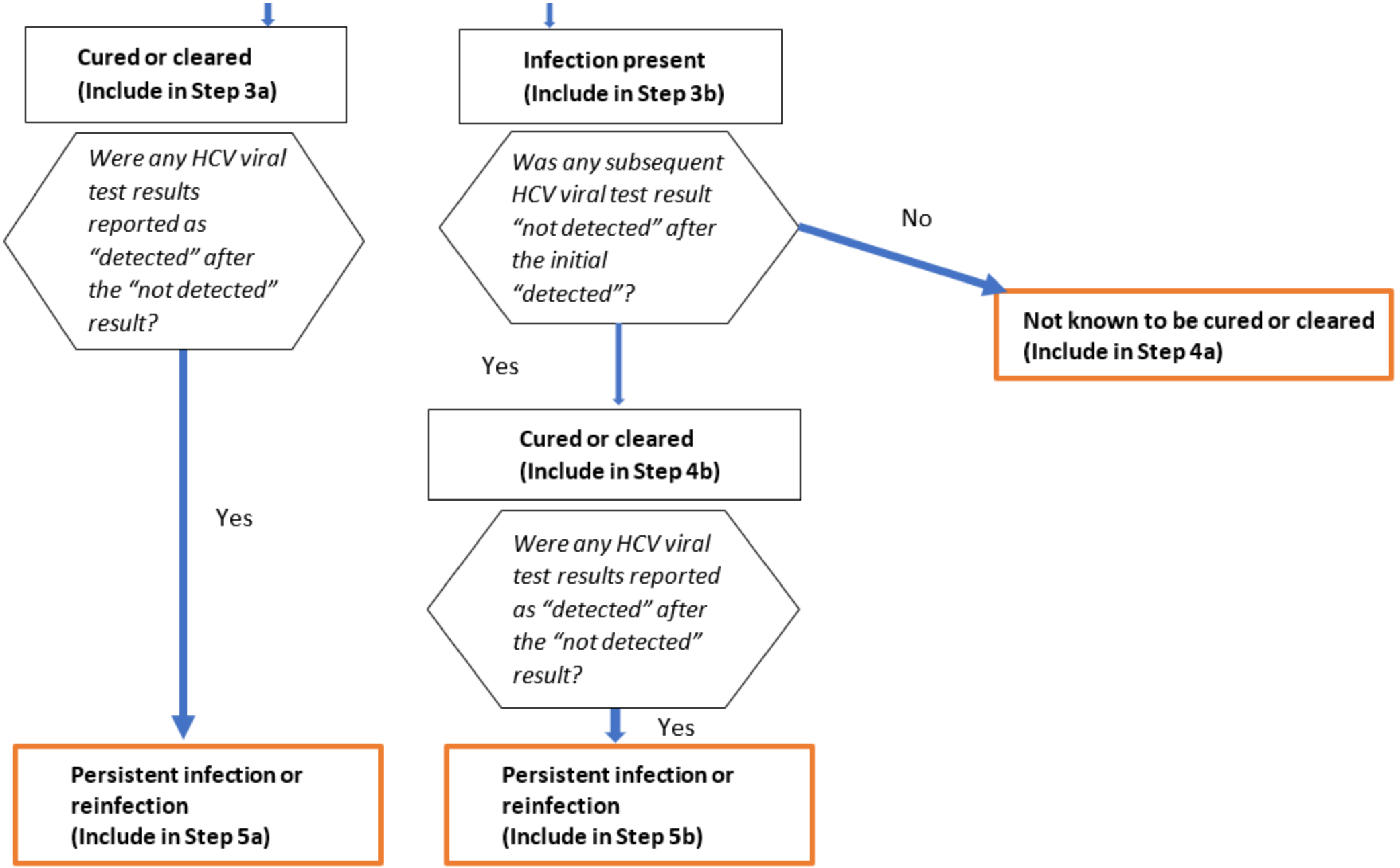
Hepatitis C Virus Clearance Cascade Time Frame for Evaluation Year “202X”



Flow Diagram to Visualize how Individuals are Assigned within the Hepatitis C Virus Clearance Cascade



Flow diagram continued…



Cascade Steps by Subpopulation

	Ever infected Step 1	Viral Testing 2b/1	Initial Infection 3b/2b	Cured/Cleared 4b/3b	Persistent infection/Reinfection 5b/4b
Total	**N**	**N, %**	**N, %**	**N, %**	**N, %**
Age*					
0–19					
20–29					
30–39					
40–49					
50–59					
60+					
Birth cohort					
Before 1945					
1945–1965					
1966–1980					
After 1980					
Gender identity					
Male					
Female					
Transgender					
Non-binary					
Race and ethnicity					
American Indian or Alaska Native					
Asian					
Native Hawaiian or other Pacific Islander					
Black					
Hispanic					
White					

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Limitations

- Potential misclassification at every Step
- Inability to disaggregate reasons for gaps in testing (healthcare access, health insurance, transportation, etc.) or treatment (linkage to care, health insurance, provider shortages, administrative barriers, etc.)
- Changes in testing practices and treatment regimens over time (fewer tests, shorter treatment courses) could lead to fewer reported lab results

Advantages

- Simplicity
- Low resource (does not require medical chart review)
- Consistency over time and across jurisdictions

Thank you!

Martha Montgomery, LWX6@cdc.gov

Creating a Standardized EHR-based Care Cascade for Hepatitis C

CDC Division of Viral Hepatitis
in partnership with the
National Association of Community Health Centers (NACHC)

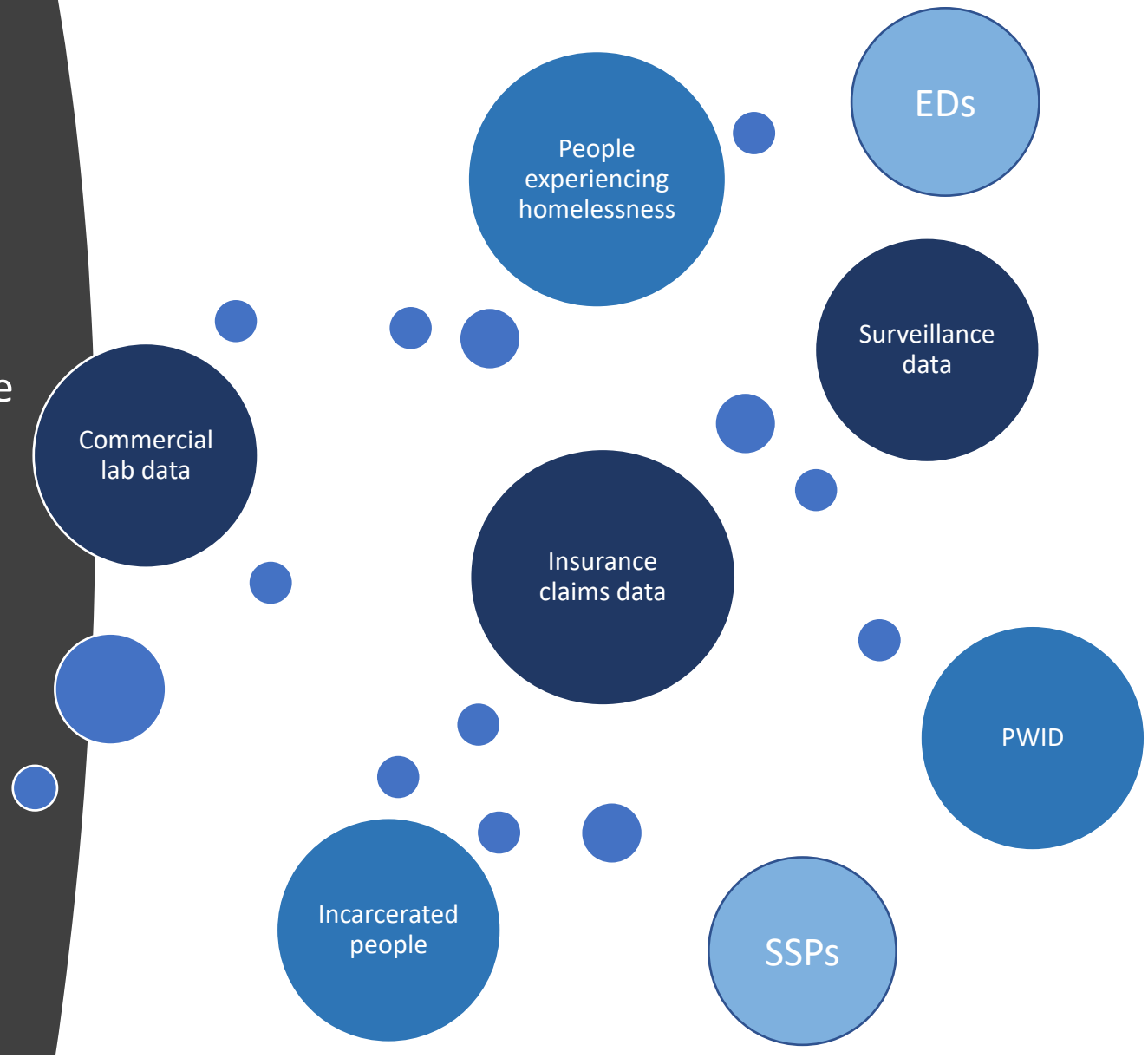
2016–2020

Liesl Hagan, MPH

vqf8@cdc.gov

Background

- No single data source can capture testing, care, and treatment for HCV in all populations
- CDC relies on a combination of data sources and data types to understand the lay of the land



Project Purpose

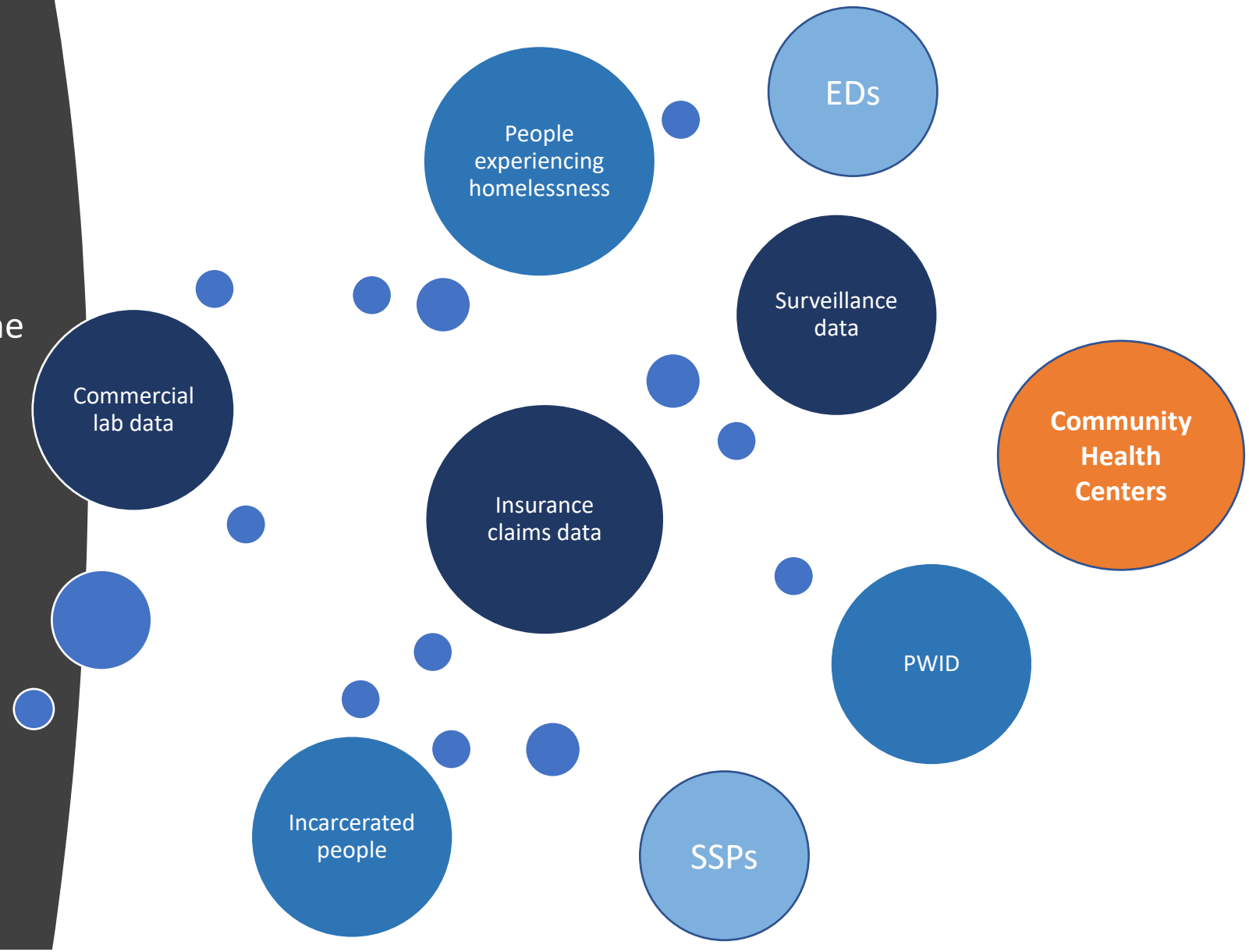
Add **Community Health Centers** to the data sources that inform our work

- Uninsured & medically underserved
- High burden of hepatitis C
- Populations with risk factors (PWID, incarcerated, homeless)

Develop standardized, scalable, EHR-based care cascades

Develop a Dashboard to monitor progress over time to monitor:

- Population health
- Facility-level quality improvement

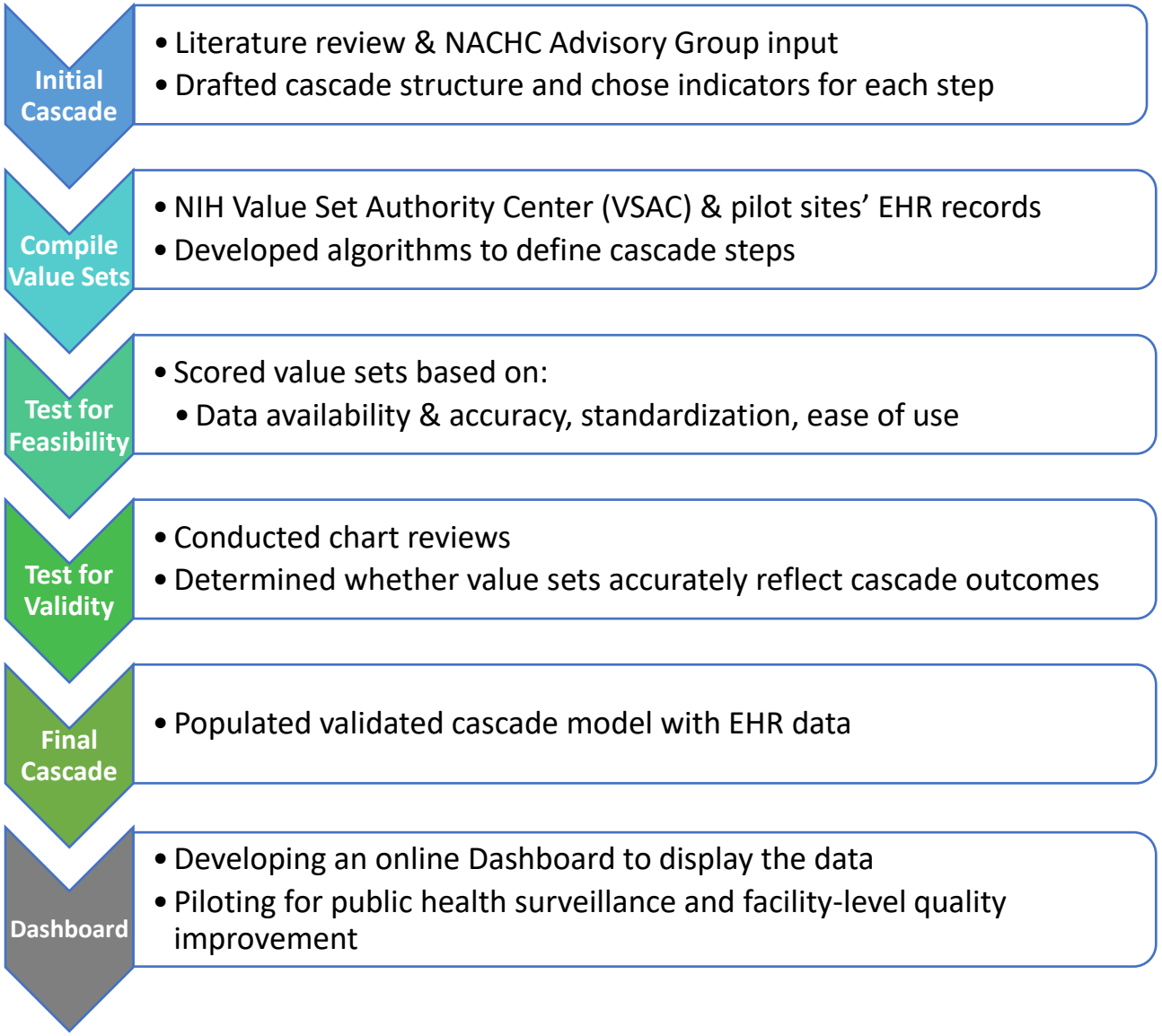


4-year Cooperative Agreement with NACHC (currently in Year 4)

NATIONAL ASSOCIATION OF Community Health Centers

America's Voice for Community Health Care

Project Flow



Initial "Consensus" HCV Care Cascade from NACHC Advisory Group Meeting

January 2017

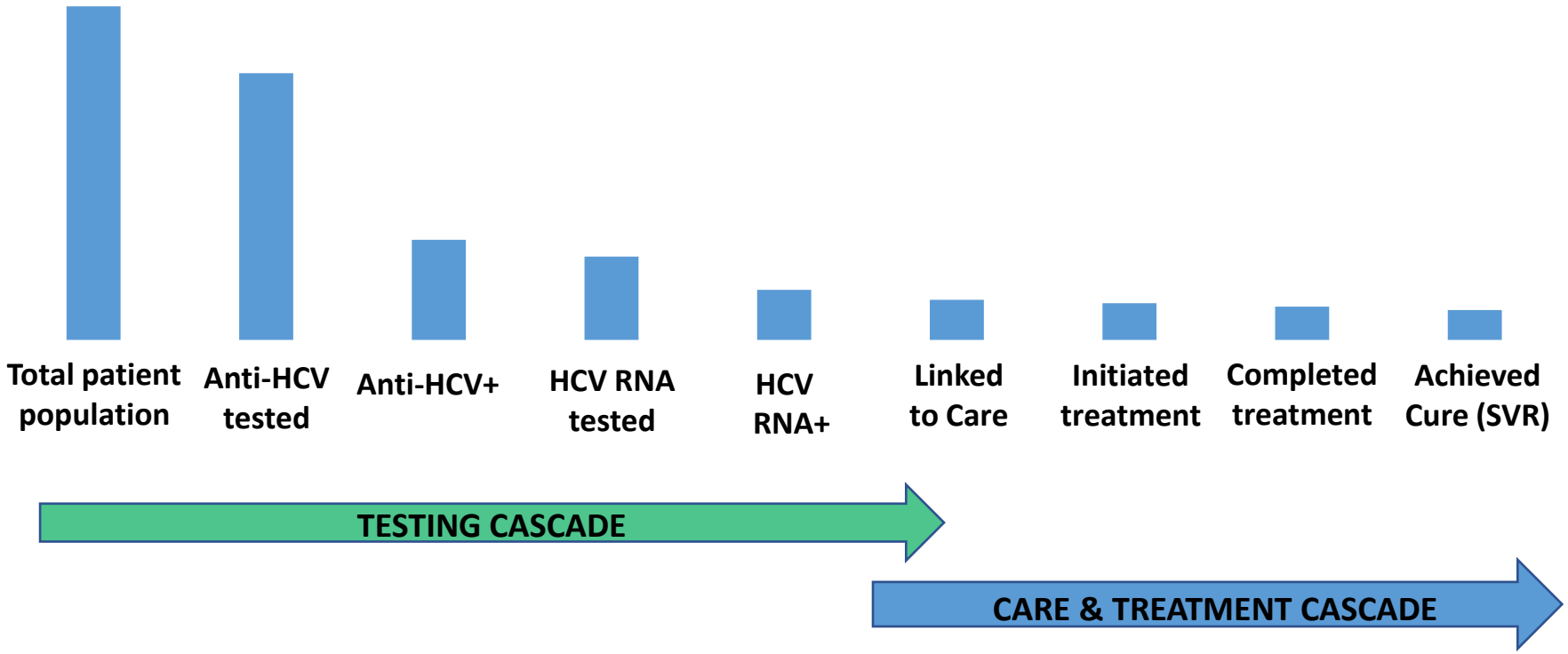
Initial Cascade ✓

Compile Value Sets

Test for Feasibility

Test for Validity

Final Cascade



Chose data indicators for each step + Standardized Value Sets → Cascade step algorithms

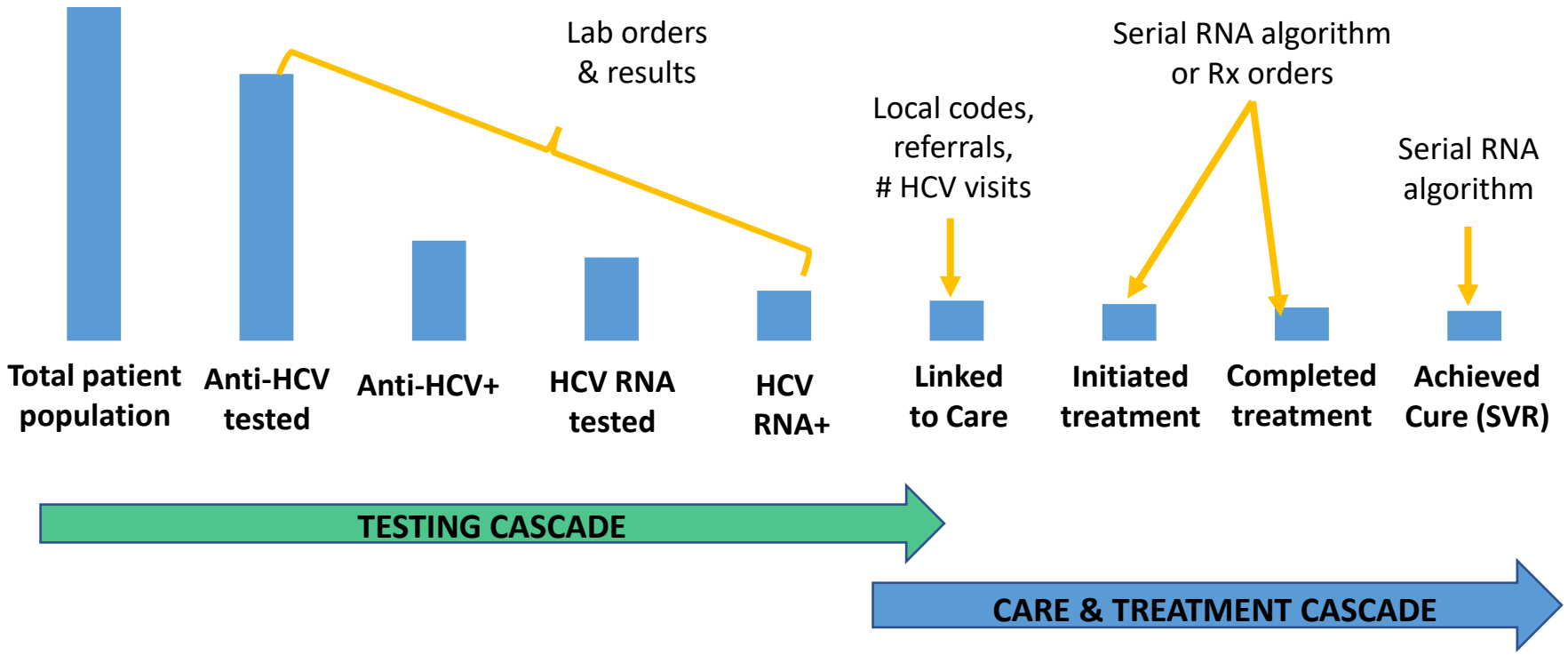
Initial Cascade

Compile Value Sets ✓

Test for Feasibility

Test for Validity

Final Cascade

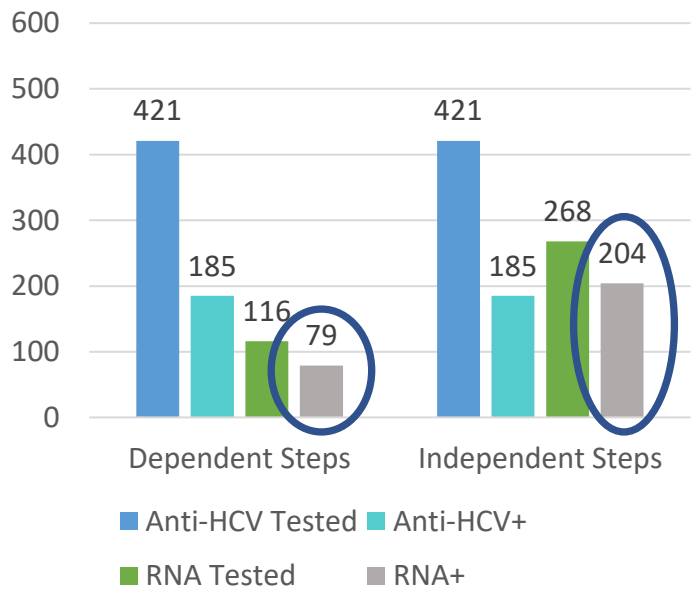


6-month Learning Collaborative with 5 Pilot Sites

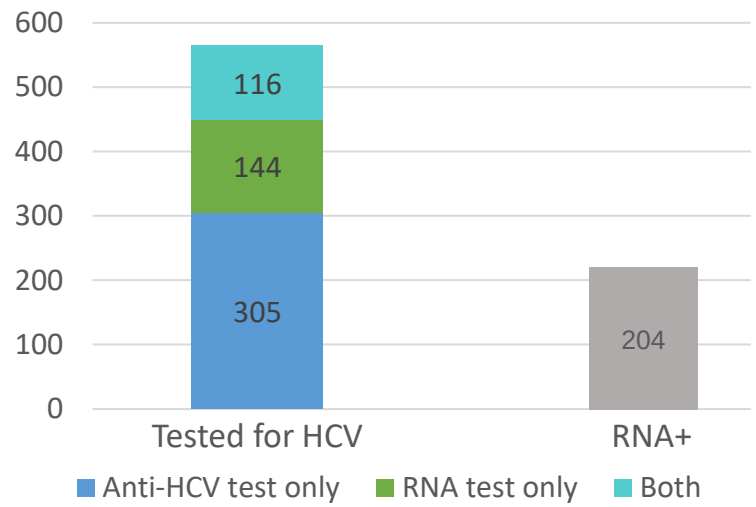
- 153 organizations and 1,903 health center sites across all 50 US states
- 13,132 providers
- 2.4 million patients
- 5 EHR systems

Cascade Step Dependencies

Separate anti-HCV and RNA Testing Bars

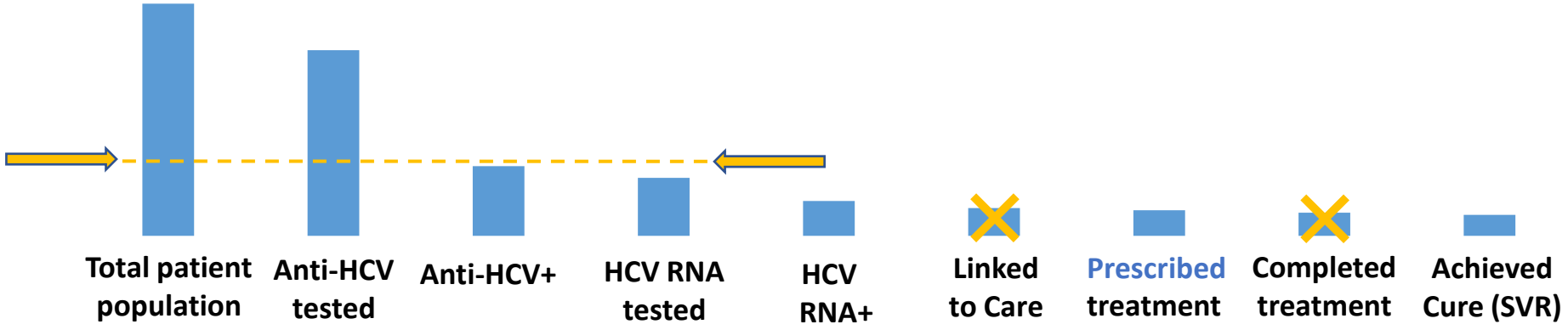


Stacked Testing Bar



Drawback: Cascade does not show how many patients with a positive anti-HCV have not been tested for RNA

Modified HCV Care Cascade



Combined anti-HCV and HCV RNA testing steps & removed step dependencies

- Prevented exclusion of patients who had been tested for anti-HCV outside the system

Dropped "Linked to Care" step

- No standardized indicators (sites use local codes or unstructured fields)

Reconsidered "Initiated tx" language

- RXNORM code doesn't necessarily mean a patient filled the Rx (or took it)

Dropped "Completed Treatment" step

- No reliable indicators (no Rx utilization data)
- Tx completion and SVR are essentially duplicative (SVR >95%)

Final HCV Care Cascade – Data from 5 Pilot Sites

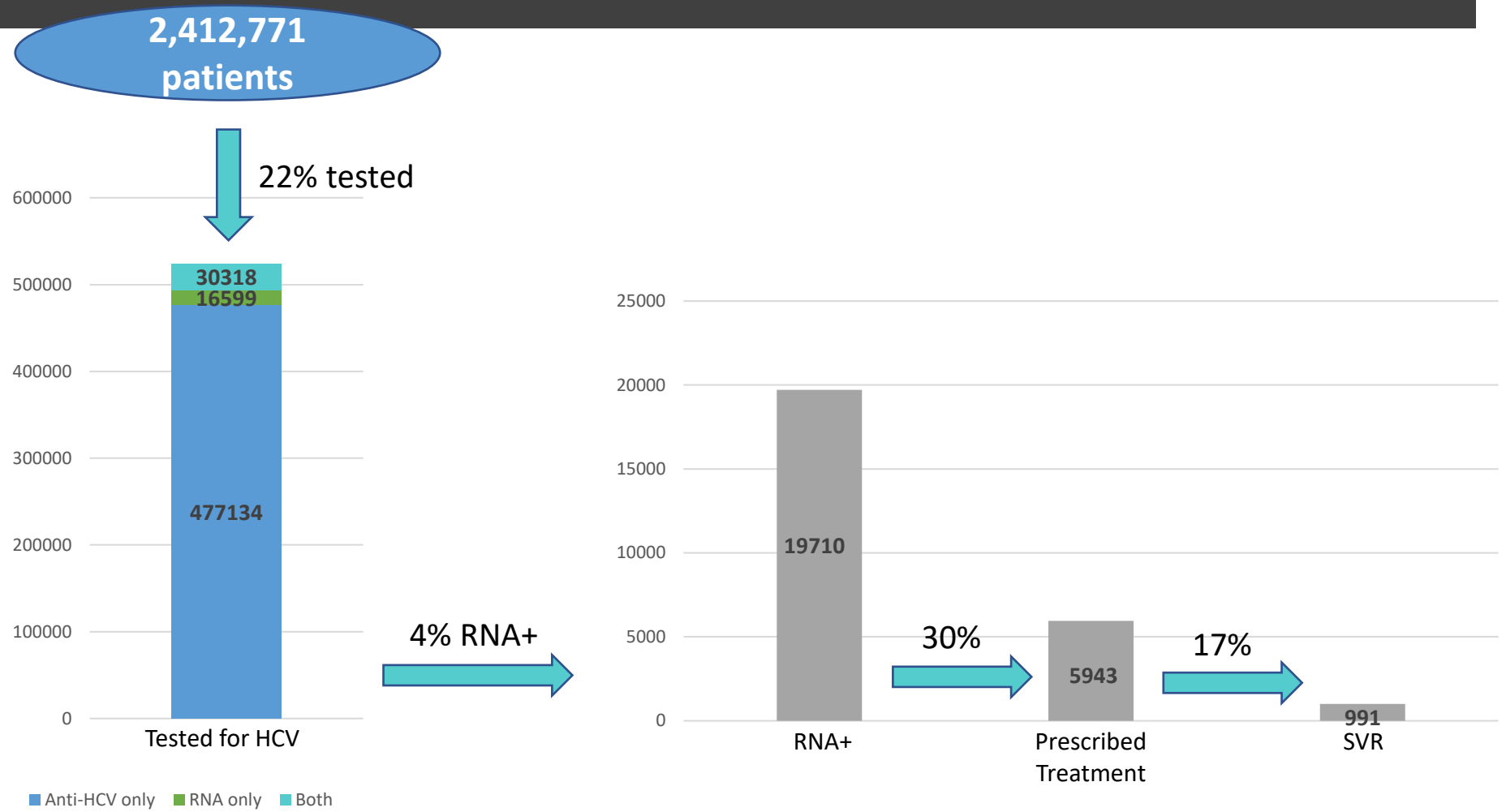
Initial Cascade

Compile Value Sets

Test for Feasibility

Test for Validity

Final Cascade ✓



Alternative – Minimalist HCV Care Cascade

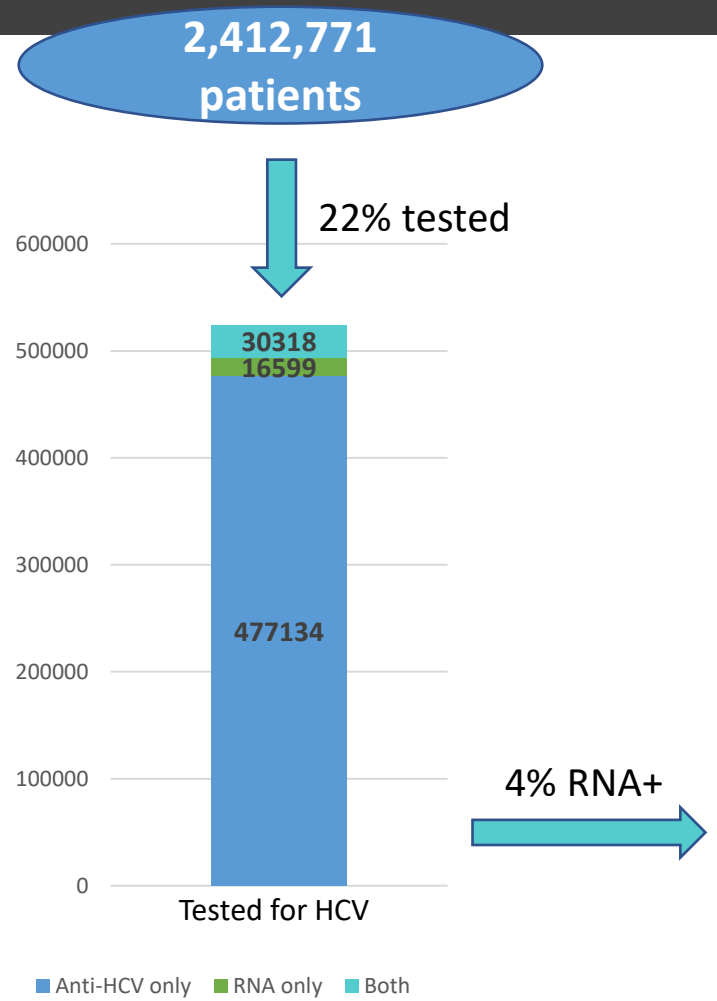
Initial Cascade

Compile Value Sets

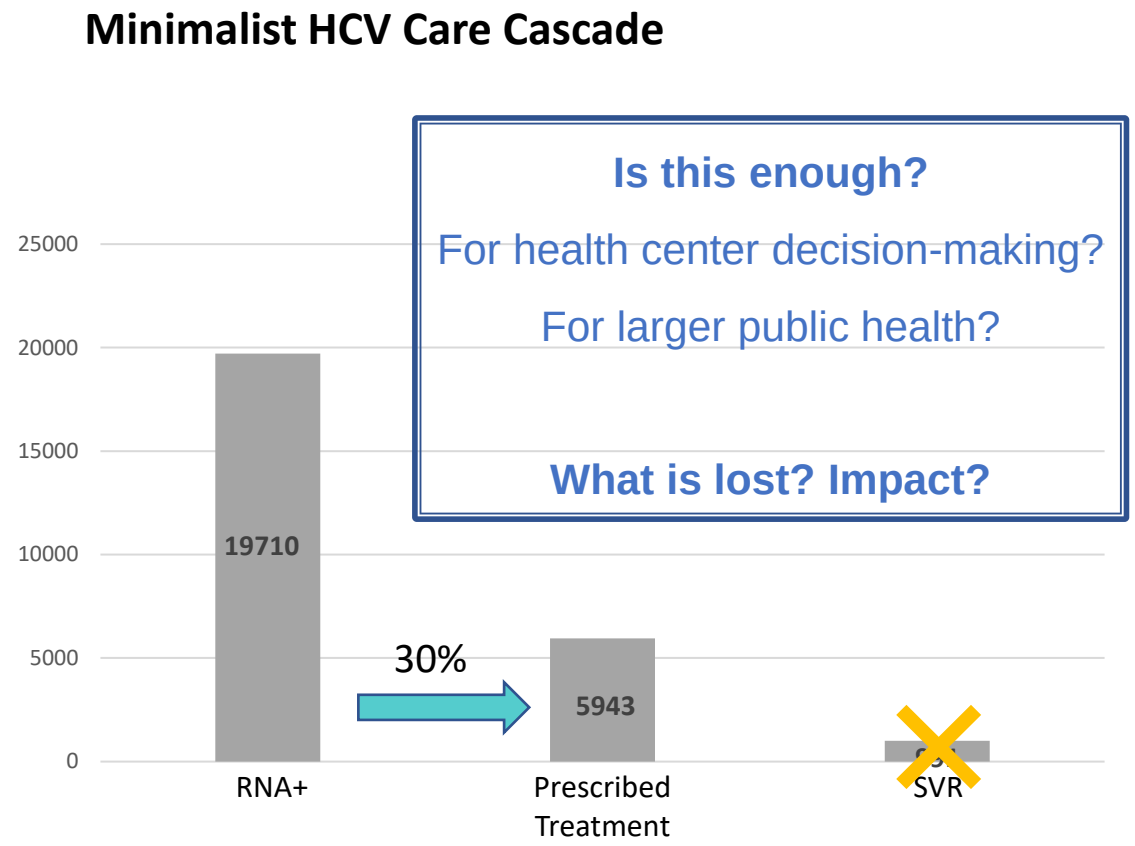
Test for Feasibility

Test for Validity

Final Cascade ✓



4% RNA+



Is this enough?

For health center decision-making?

For larger public health?

What is lost? Impact?

Next Steps

Publish care cascade methods and validation results (*in progress*)

Create a Dashboard that can display aggregate facility-level care cascade data on an ongoing basis.

Pilot the Dashboard:

- Population health monitoring *(CDC, state health departments)*
- Facility-level intervention testing to improve progress through the HCV care cascade *(4 health center sites - ongoing)*

Conclusions

EHR data can provide important information to enhance an HCV care cascade

Important to align the concept with the data available
(e.g., treatment prescribed vs. initiated)

Cascades can be built differently based on sites' needs and data available
(e.g., local codes)

Distilling the cascade into its essential elements, with high-quality data, can improve its usefulness

Q&A

Next Steps

- **Explore developing your hepatitis C care cascade with what data you have.**

- **Route your care cascade questions to David Stephens (dstephens@npaihb.org).**
  - David will batch questions and send to CDC to respond to
  - If there are recurring questions, CDC may hold office hours

(EXTRA SLIDES)

HCV Care Cascade Algorithms

Care Cascade Step Definitions

- **HCV Tested – anti-HCV only**
  - LOINC code for an anti-HCV test is present

- **HCV Tested – RNA only**
  - LOINC code for an HCV RNA test is present

- **HCV Tested – both anti-HCV and RNA**
  - LOINC code for an anti-HCV test is present
    AND
  - LOINC code for an HCV RNA test is present

- **HCV RNA+**
  - LOINC code for a positive HCV RNA test result is present

HCV Care Cascade Algorithms

- **Prescribed Treatment**

  At least one of the following 3 conditions is met:

  1. An RXNORM code for HCV medication is present
     (NOTE: Ribavirin or interferon alone do not qualify as HCV treatment; they must be prescribed in combination with each other or with a direct-acting antiviral on the med list)
  2. A LOINC code for an initial positive HCV RNA result is present, followed by LOINC codes for 2 additional RNA test results at any interval, regardless of result
  3. A patient qualifies for the SVR step (below) but does not meet conditions 1 or 2 above (treatment is implied by cure).

  NOTE: A patient can qualify for the "Prescribed Treatment" step regardless of whether they qualify for the "HCV Tested" or" RNA+" steps.

- **SVR**
  - A LOINC code for an initial positive HCV RNA result is present, followed by BOTH:
    - LOINC codes for 2 additional RNA test results at any interval (regardless of result) AND
    - LOINC code for 1 additional negative RNA result ≥12 weeks later

  NOTE – A patient can qualify for the "SVR" step regardless of whether they qualified for the "Treatment Prescribed" step.

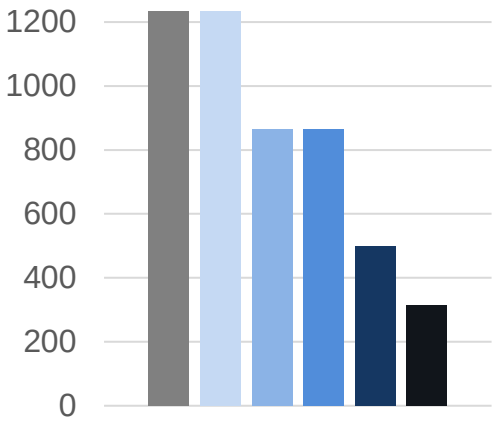
Additional HCV Linkage Indicators (early)

Linked to Care	
Newly diagnosed with chronic HCV in the reporting period	
Tests/procedures ORDERED	
	HCV genotype test ordered
	CT scan ordered with HCV listed as reason
	MRI ordered with HCV listed as reason
	Liver function tests ordered with HCV listed as reason
	APRI/FIB-4 components ordered
Test/procedure RESULTS available in EHR	
	HCV genotype test result available in EHR results section
	Ultrasound results available in EHR
	Liver biopsy results available in EHR
	Fibrosure results available in EHR
	Fibroscan results available in EHR
	APRI/FIB-4 component results available in EHR
	Any follow-up HCV RNA test result in EHR results section after initial RNA

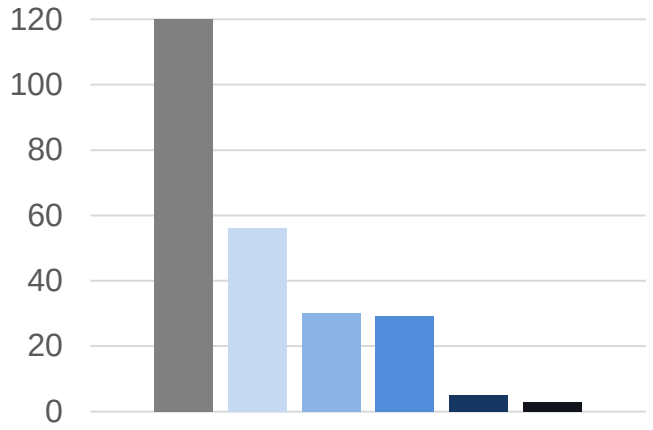
Test/procedure RESULTS available in a note	
	HCV genotype test result available in EHR results section
	Ultrasound results available in EHR
	Liver biopsy results available in EHR
	Fibrosure results available in EHR
	Fibroscan results available in EHR
	APRI/FIB-4 component results available in EHR
Staging date available in EHR	
Evidence of HCV diagnosis discussion with provider	
Case management/care coordination	
Monitoring/counseling	
Evidence of clinic visit with an HCV diagnosis code	
Evidence of at least 2 clinic visits with an HCV diagnosis code	
Completed referral to ID or GI specialist	
HCV prescription order available in EHR	

Round 1 HCV pilot – site level data

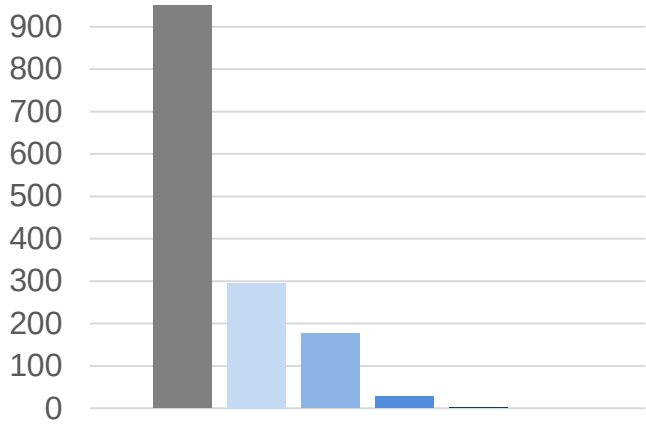
El Rio
40% tested / 8% anti-HCV+



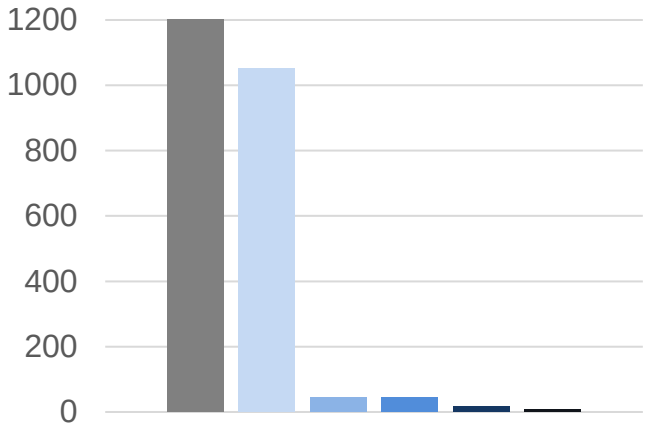
Fenway
19% tested / 1.3% anti-HCV+



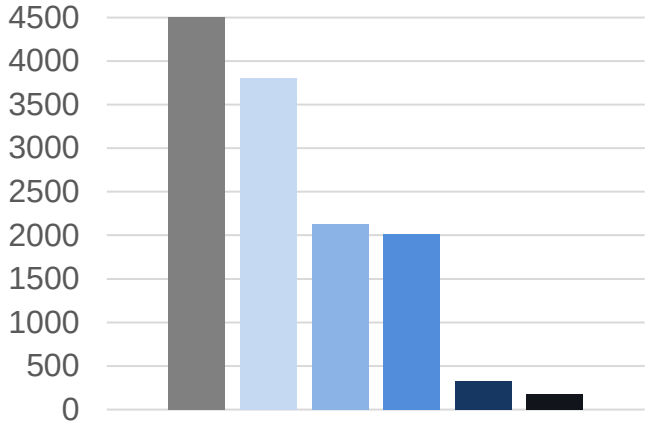
Kentucky Care
18% tested / 12% anti-HCV+



AllianceChicago
16% tested / 4% anti-HCV+



OCHIN / PCORI
8.8% tested / 9.4% anti-HCV+



Ever anti-HCV+

Ever HCV RNA tested

Ever HCV RNA+

Ever linked to care

Ever initiated HCV tx

Ever achieved SVR