



Open-Source Solutions for Public Health Innovation: Practical Tools and Lessons from the Field

Aug. 19, 2025 | 2025 ARC Preconference

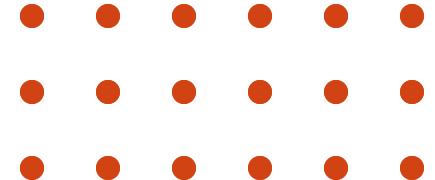
SHAPING TOMORROW'S PUBLIC HEALTH TODAY.

Session Objectives

- Share and highlight how grantees are using open-source data tools to advance modernization efforts.
- Leave attendees with actionable tools.
- Attendees could provide input on which tools would be helpful to have as open source.

Session Outline

- Welcome
- Lessons from the Field – Jurisdiction Spotlight
- Audience Q&A



Meet the Speakers

Dan Paseltiner

Lead DIBBS Engineer,
Skylight (CDC Contractor)

Melody Brown, MPH, MHSA, A-CSPO

Acting Branch Chief & DMI
Co-Director, LA County
Dept. of Public Health

Jennifer Rico, MA

Surveillance and
Informatics Section
Supervisor, Montana
Dept. of Public Health
and Human Services

DIBBs Products

Data Integration Building Blocks (DIBBs)

April 2025



Data Integration Building Blocks

DIBBs are **modular, open-source** software that **empower jurisdictions to make the most of their data**.

Electronic Case Reporting (eCR) is the automated, real-time exchange of case report information between electronic health records and public health agencies



eCR Viewer

Improve eCR access and readability for PHAs



eCR Refiner

Tune the size and content of your eCRs



Query Connector

Get data from HCOs with a single search



Record Linker

Control how patient records are matched and merged



eCR Refiner

Tune the size and content of your eCRs

Discovery

Build

Problems

- eCRs often contain multiple reportable conditions and large amounts of patient data that may or may not be relevant to those reportable conditions, complicating case confirmation and eCR automation
- Inclusion of sensitive data poses legal/privacy issues
- Size of eCRs often causes processing and storage issues

Solution

An application where users can define the desired content of their eCRs and refine accordingly

Outcomes

- Increased number of reportable conditions utilizing eCRs
- Reduced time to identify cases
- Reduced incidence of legal/privacy issues
- Reduced performance and storage issues

eCR Refiner Overview

As it exists today:

- Jurisdiction-hosted
- Cloud-based, containerized API & command line tool
- Takes an eICR and section/condition codes & returns an eICR with only relevant content

Where we're potentially headed:

- Intermediary-hosted (e.g. AIMS)
- Now: split and filter based on reportable conditions & APHL Terminology Exchange Service (TES)
- Next: split and filter based on optional templates or custom, user-defined filters

We are looking for STLT partners to work with and get feedback from – please reach out to us at dibbs@cdc.gov if you are interested in the eCR Refiner!



Record Linker

Build

Reduce duplicative patient data

Problem

Public health agencies routinely grapple with fragmented, incomplete, and duplicate patient records

These discrepancies are compounded when records span multiple systems or providers.

Linking disparate patient records together can be a complex and time-consuming process that often relies on manual effort, leading to inefficiencies in disease tracking, inaccurate case counts, and delays in public health response.

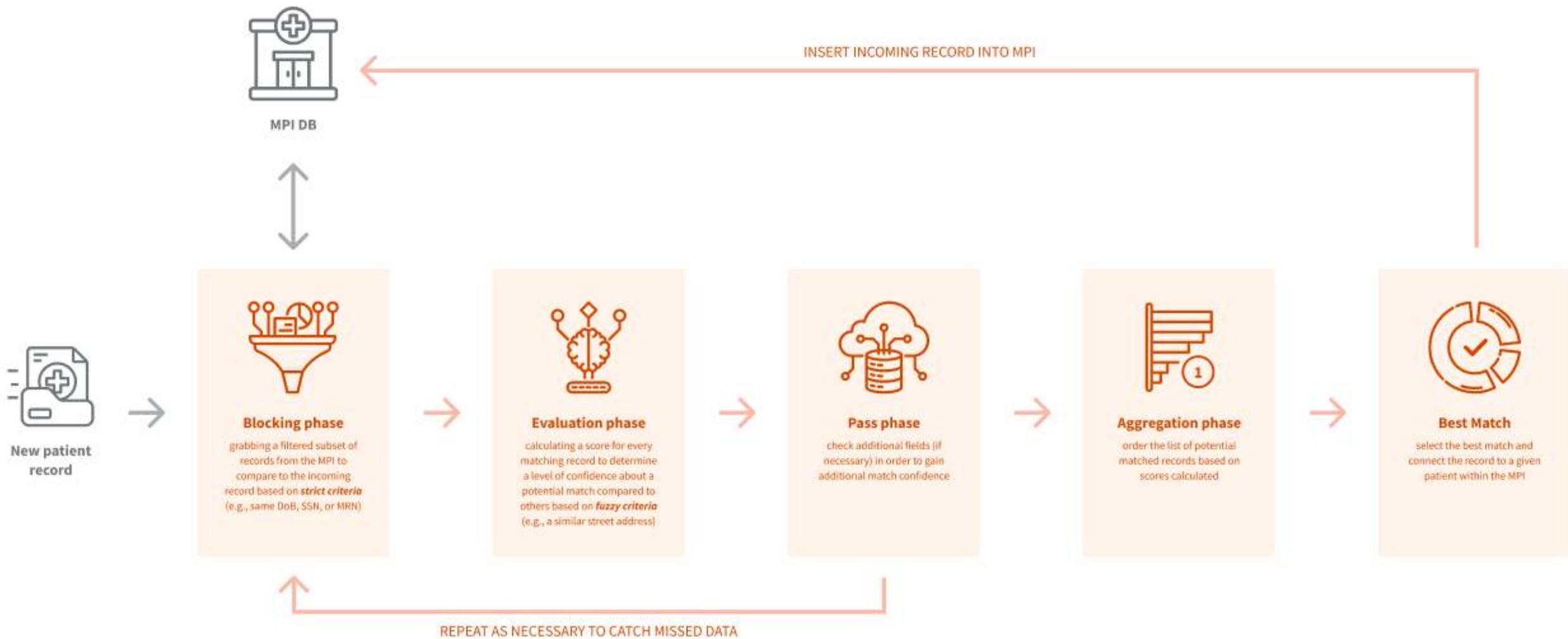
Solution

A stand alone master patient index (MPI) that is compatible with many systems, is flexible, accurate, and provides transparency into the algorithm used to match patient records. This tool will deduplicate records, match incomplete patient records, and provide the ability to review "possible matches."

Outcomes

- More complete and accurate records
- Greater efficiency in manual review
- Improved workload management

Record Linker Algorithm – Process Diagram



Record Linker Features: Highly Configurable Algorithm

DIBBs Record Linker – Demo Site Algorithm configuration settings

Algorithm configuration

Fine-tune review thresholds to strike the right balance between automation and manual oversight

Blocking criteria ⓘ

Exclude records that meet the following conditions:

Last name
The first 4 characters of the patient's last name. Score: 5.0

Date of birth
The patient's birthdate in the format YYYY-MM-DD. Score: 10.0

Matching criteria ⓘ
Include records that meet the following conditions:

First name
The first 4 characters of the patient's first name. Score: 5.0

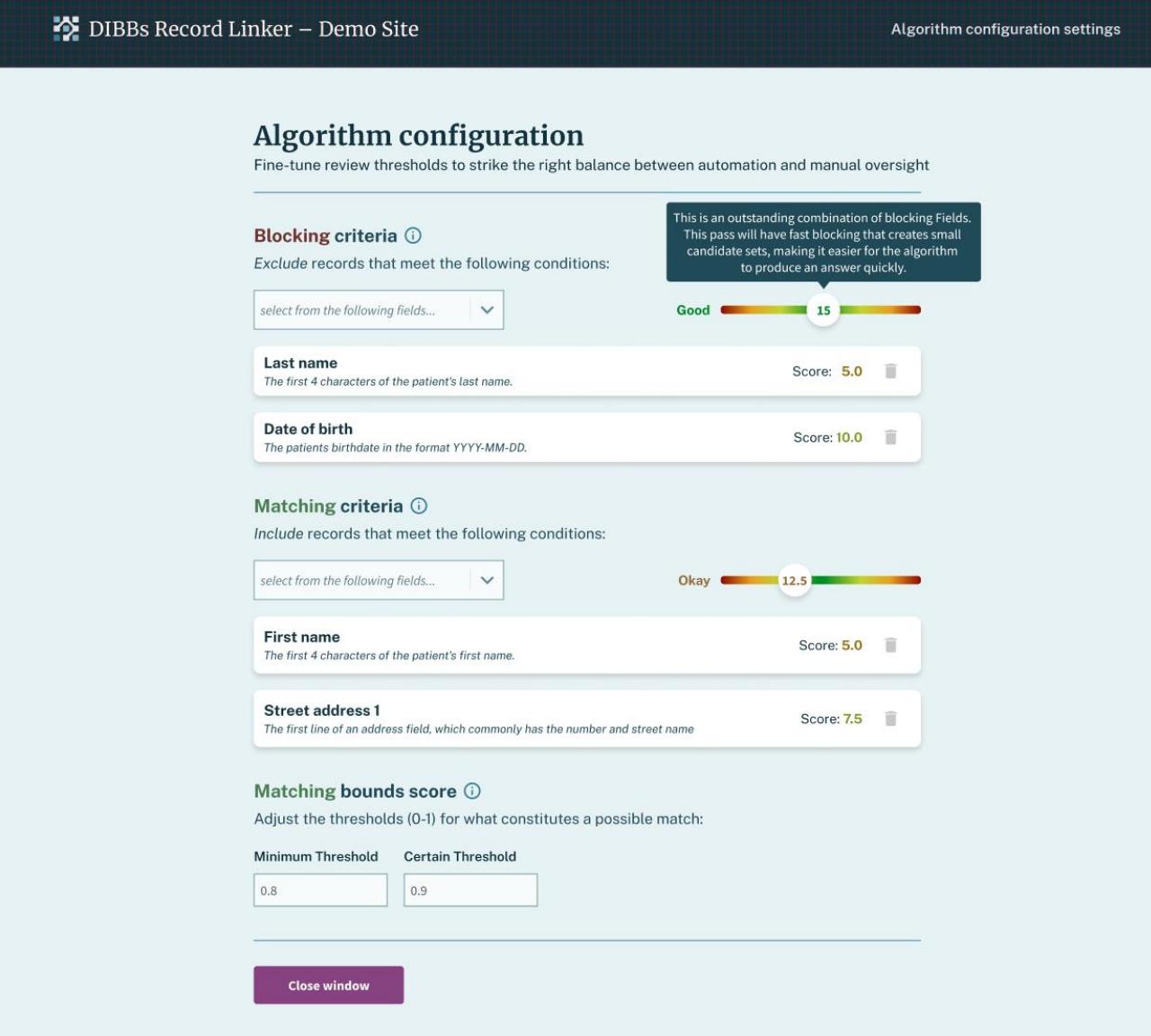
Street address 1
The first line of an address field, which commonly has the number and street name Score: 7.5

Matching bounds score ⓘ
Adjust the thresholds (0-1) for what constitutes a possible match:

Minimum Threshold Certain Threshold

Close window

This is an outstanding combination of blocking Fields. This pass will have fast blocking that creates small candidate sets, making it easier for the algorithm to produce an answer quickly.





Query Connector

Pilot

Get data from HCOs with a single search

Problems

Access to public health data is currently based on a model in which jurisdictions are pushed data via eCRs and ELRs. Supplemental data is often required to take public health action. Jurisdictions are burdened with finding the additional relevant data to take action on. The legal and technical burden to get set up to receive data is high.

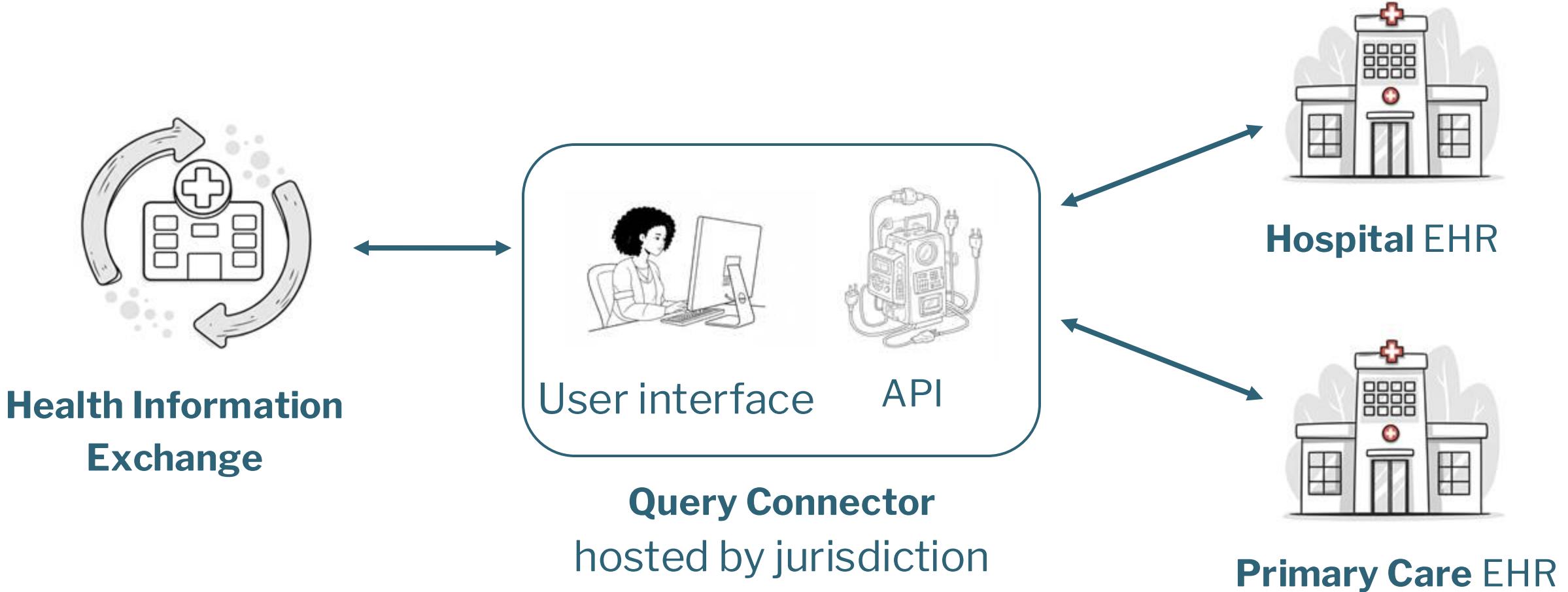
Solution

A secure, robust FHIR client that can be accessed by UI or API to connect to Health Care Organizations and retrieve targeted patient data. The queries sent to HCO's are customizable to protect patient privacy and uphold the minimum necessary standard. Our connection to HCO's utilizes an HCO's exposed FHIR API. Query Connector can leverage existing Data Use agreements like DURSA and has first class support for TEFCA.

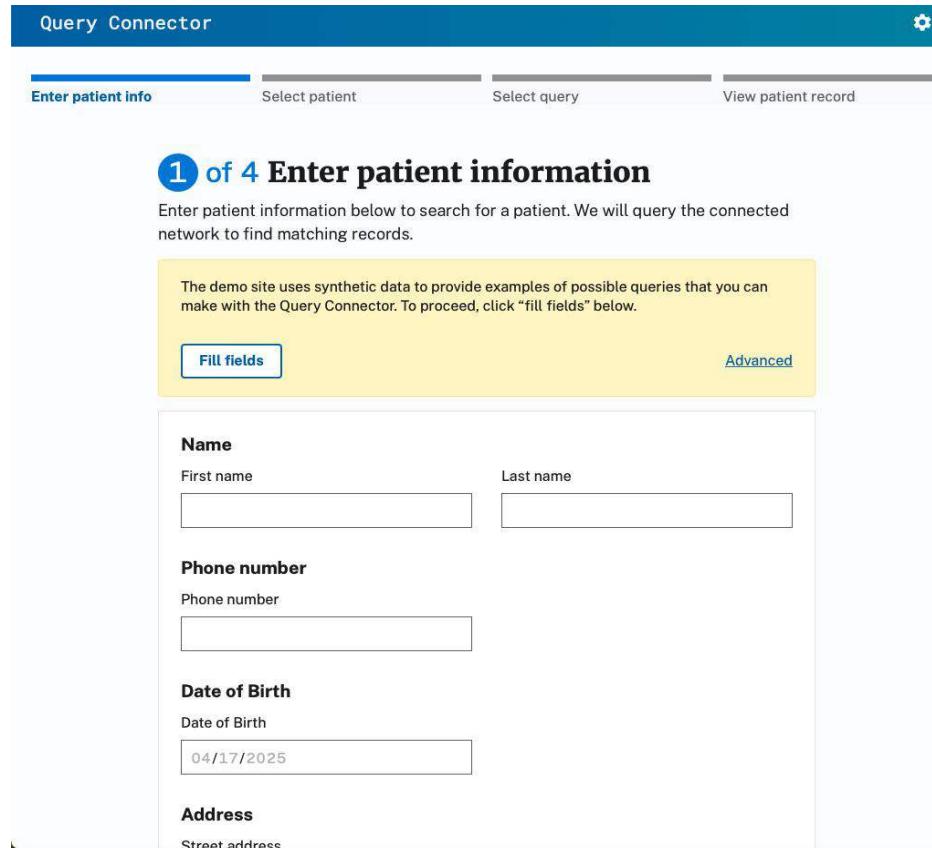
Outcomes

Faster access to patient data
More complete data for public health departments
Limit access to minimum necessary data

At a glance – HIE & Hospital connections



Query Connector: Two Ways



The screenshot shows the 'Query Connector' web-based user interface. The top navigation bar includes tabs for 'Enter patient info' (which is active and highlighted in blue), 'Select patient', 'Select query', and 'View patient record'. Below the navigation, a section titled '1 of 4 Enter patient information' is displayed. A sub-instruction says: 'Enter patient information below to search for a patient. We will query the connected network to find matching records.' A yellow callout box contains the text: 'The demo site uses synthetic data to provide examples of possible queries that you can make with the Query Connector. To proceed, click "fill fields" below.' It includes 'Fill fields' and 'Advanced' buttons. The main form area contains fields for 'Name' (First name and Last name), 'Phone number', 'Date of Birth' (Date of Birth: 04/17/2025), and 'Address' (Street address).

Web-based User Interface (UI)

- Conduct **individual** searches by inputting patient demographics
- Manage user access through **custom permissions**

API

- Can be automated to connect with a jurisdiction's own data system
- Works from anywhere in a jurisdiction's workflow (most commonly via Rhapsody)

Check it out yourself @ <https://demo.queryconnector.dev/>



eCR Viewer

Pilot

Improve eCR access and readability for PHAs

Problems

It's challenging for case investigators, epis, and others to **find the information they need** in an eCR.

Users need to **search through lengthy documents** for information relevant to a case.

Solution

eCR Viewer provides...

- Unified view of eICR & Reportability Response (RR) documents
- Consistent format, regardless of provider
- Highlights important condition information up front

Outcomes

- Less manual effort to review eCRs
- Faster time to decision
- An efficient, delightful eCR experience for case investigators & epis in your jurisdiction

Bugs Bunny 12/07/1989

[← Back to eCR Library](#)

[eCR Summary](#)

[eCR Document](#)

[Patient Info](#)

[Demographics](#)

[Social History](#)

[Encounter Info](#)

[Encounter Details](#)

[Facility Details](#)

[Provider Details](#)

[Clinical Info](#)

[Symptoms and
Problems](#)

[Treatment Details](#)

[Immunizations](#)

[Diagnostics and Vital
Signs](#)

[Lab Info](#)

[Lab Results from
Castle Lab](#)

[eCR Metadata](#)

[RR Details](#)

eCR Summary

Provides key info upfront to help you understand the eCR at a glance

Patient Summary

Patient Name Bugs Bunny

DOB 12/07/1989

Sex Female

Race White

Ethnicity Not Hispanic or Latino

Patient Address 999 Single Lane

Hudson County, NY

07086, USA

Patient Contact Home: +1-999-999-9999

Mobile: +1-999-999-9999

bugs.bunny@gmail.com

Encounter Summary

Encounter Date/Time Start: 02/18/2022 9:01 AM

End: 02/18/2022 10:47 AM

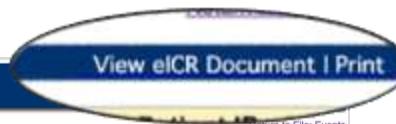
Encounter Type Ambulatory

eCR Viewer Integrations

Two options offered:

1. Direct integration of core Viewer page within a surveillance system

Currently available for NBS (6.0.16.2). EpiTrax integration coming later this year



Home | Data Entry | Merge Patients | Open Investigations | Reports | System Management

View Document

Create Investigation | Transfer Ownership | Delete

thorX1 odinsonX1 | Female | 04/20/1990

Jurisdiction: Fulton County Program Area: ARBO Created: 02/24/2023 By: PKS PKS

Date Received: 02/24/2023 Document ID: DOC10000002GA01 (Update) Last Updated: 02/24/2023 By: PKS PKS

Patient ID: 67084

Public Health Case Report - Data From Legacy System To CDA

Go to: SENDING SYSTEM INFORMATION | PATIENT INFORMATION | SOCIAL HISTORY INFORMATION | CLINICAL INFORMATION | Encounters | Social History | Plan of Treatment | Results | Problems | History of Present Illness | Medications Administered | Reason for Visit |

SENDING SYSTEM INFORMATION

Message Type	Public Health Case Report - PHRI	Sending System ID	2.16.840.1.113883.19.5
Sending Facility	Level Seven Healthcare, Inc.	Sending System	
Message Creation Date	November 7, 2016, 09:44:21	Message Status	SetId: ONGOING_CASE Version: 1

PATIENT INFORMATION

Patient Name	thorX1 odinsonX1	Sending System Patient ID	CSR1000010XX01 (2.16.840.1.113883.4.1) 111-00-1234 (2.16.840.1.114222.4.5.1)
Date of Birth	April 20, 1990	Reported Age	
Race	White (2106-3)	Ethnicity	Hispanic or Latino (2135-2)
Sex	Female (F)	Contact Info	Home: 21 Bell Street Atlanta, NOT_MAPPED, Georgia 30309, United States +1-555-555-2003 (Primary Home)

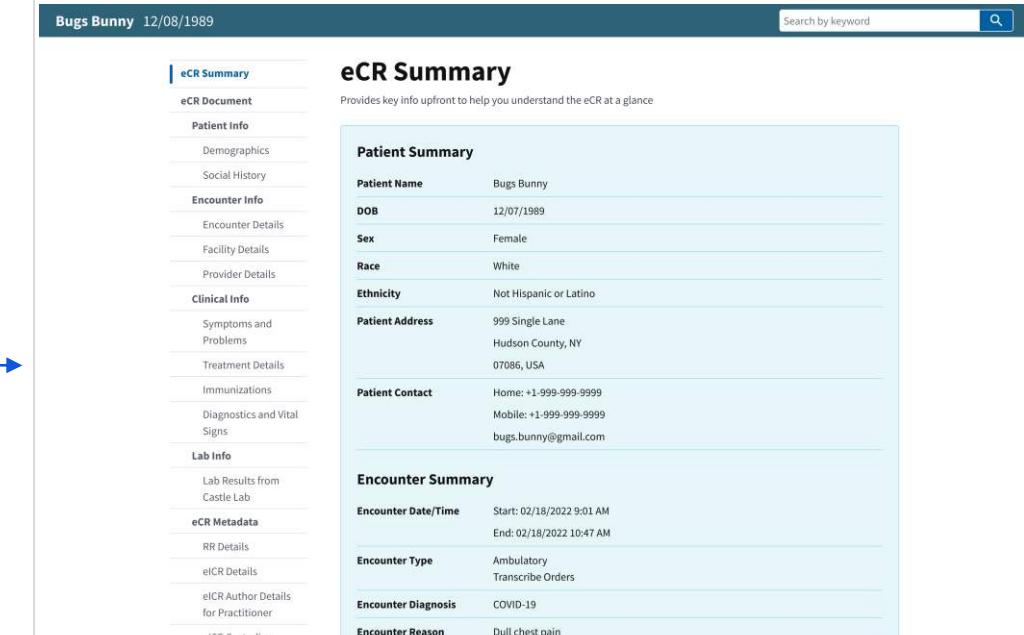
SOCIAL HISTORY INFORMATION

Birth Sex:	Female (F) / Female (F)	Is this person deceased?	No (N) / FALSE (false)
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CLINICAL INFORMATION

Investigation ID	2.16.840.1.113883.4.6.99937012.3928002	Condition	Zika virus disease (disorder) (3928002)
Pregnancy Status	No (N) / No (N)	Physician	Henry Seven 4444 Healthcare Drive Ann Arbor, Michigan 99999, United States

NBS - "View eCR Document" Button



Bugs Bunny 12/08/1989

Search by keyword

eCR Summary

Provides key info upfront to help you understand the eCR at a glance

Patient Summary

Patient Name	Bugs Bunny
DOB	12/07/1989
Sex	Female
Race	White
Ethnicity	Not Hispanic or Latino
Patient Address	999 Single Lane Hudson County, NY 07086, USA
Patient Contact	Home: +1-999-999-9999 Mobile: +1-999-999-9999 bugs.bunny@gmail.com

Encounter Summary

Encounter Date/Time	Start: 02/18/2022 9:01 AM End: 02/18/2022 10:47 AM
Encounter Type	Ambulatory Transcribe Orders
Encounter Diagnosis	COVID-19
Encounter Reason	Dull chest pain

Individual eCR



eCR Viewer Integrations

Two options offered:

2. Standalone tool – the eCR Library

eCR Viewer

eCR Library

FILTERS: Last 24 hours Reportable Condition

Patient	Received Date	Encounter Date	Reportable Condition	RCKMS Rule Summary
> Darth Maulle V3 DOB: 11/04/1989	12/23/2022 2:59 PM	12/23/2022 2:59 PM	Viral hepatitis type C (disorder)	Detection of Hepatitis C virus antibody in a clinical specimen by any method
			Disease caused by severe acute respiratory syndrome coronavirus 2 (disorder)	Detection of SARS-CoV-2 nucleic acid in a clinical or post-mortem specimen by any method
				COVID-19 (as a diagnosis or active problem)
> General Grevioux V2 DOB: 2/17/1984	12/23/2022 2:59 PM	12/23/2022 2:59 PM	Overdose of opiate (disorder)	Detection of opioid substance or metabolite in a clinical specimen by any method
				Vital status at end of encounter is alive or unknown
Luke Skywalker DOB: 12/12/2020	12/23/2022 1:43 PM	12/23/2022 1:43 PM	Malignant neoplastic disease (disorder)	Malignant or in situ neoplasm, or a benign or borderline primary intracranial or central nervous system tumor (as a diagnosis or active problem)
Captain Rex DOB: 4/3/2005	12/23/2022 10:57 AM	12/23/2022 10:57 AM	Salmonella infection (disorder)	Detection of Salmonella species and serovars nucleic acid (except S. typhi and S. paratyphi nucleic acid) in a clinical specimen by any method
Death Vader DOB: 1/14/1948	12/23/2022 9:00 AM	12/23/2022 9:00 AM	Malignant neoplastic disease (disorder)	Malignant or in situ neoplasm, or a benign or borderline primary intracranial or central nervous system tumor (as a diagnosis or active problem)
Count Dooku DOB: 7/22/1984	12/23/2022 8:05 AM	12/23/2022 8:05 AM	Disease caused by severe acute respiratory syndrome coronavirus 2 (disorder)	COVID-19 (as a diagnosis or active problem)
Admiral Motti DOB: 1/14/1948	12/23/2022	12/23/2022	Disease caused by severe acute respiratory	COVID-19 (as a diagnosis or active problem)

Showing 1-25 of 757 eCRs

1 2 3 4 ... 38 [Next >](#)

eCRs per page: 25 [▼](#)

eCR Library



eCR Viewer

Bugs Bunny 12/07/1989

[← Back to eCR Library](#)

eCR Summary

Provides key info upfront to help you understand the eCR at a glance

Patient Summary

Patient Name	Bugs Bunny
DOB	12/07/1989
Sex	Female
Race	White
Ethnicity	Not Hispanic or Latino
Patient Address	999 Single Lane Hudson County, NY 07086, USA
Patient Contact	Home: +1-999-999-9999 Mobile: +1-999-999-9999 bugs.bunny@gmail.com

Encounter Summary

Encounter Date/Time	Start: 02/18/2022 9:01 AM End: 02/18/2022 10:47 AM
Encounter Type	Ambulatory

Individual eCR



Thank you!

For more information about all our products, see our
Github repositories:

[CDCgov/dibbs-ecr-viewer](https://github.com/CDCgov/dibbs-ecr-viewer)

[CDCgov/dibbs-ecr-refiner](https://github.com/CDCgov/dibbs-ecr-refiner)

[CDCgov/dibbs-query-connector](https://github.com/CDCgov/dibbs-query-connector)

[CDCgov/RecordLinker](https://github.com/CDCgov/RecordLinker)

August 18, 2025 | ARC Data Modernization in Motion Preconference

SaTScan™ Utilization for Electronic Lab Report Monitoring in Los Angeles County

Data Operations Unit
Disease Control Informatics Branch
Los Angeles County Dept of Public Health



ELRs in Los Angeles County

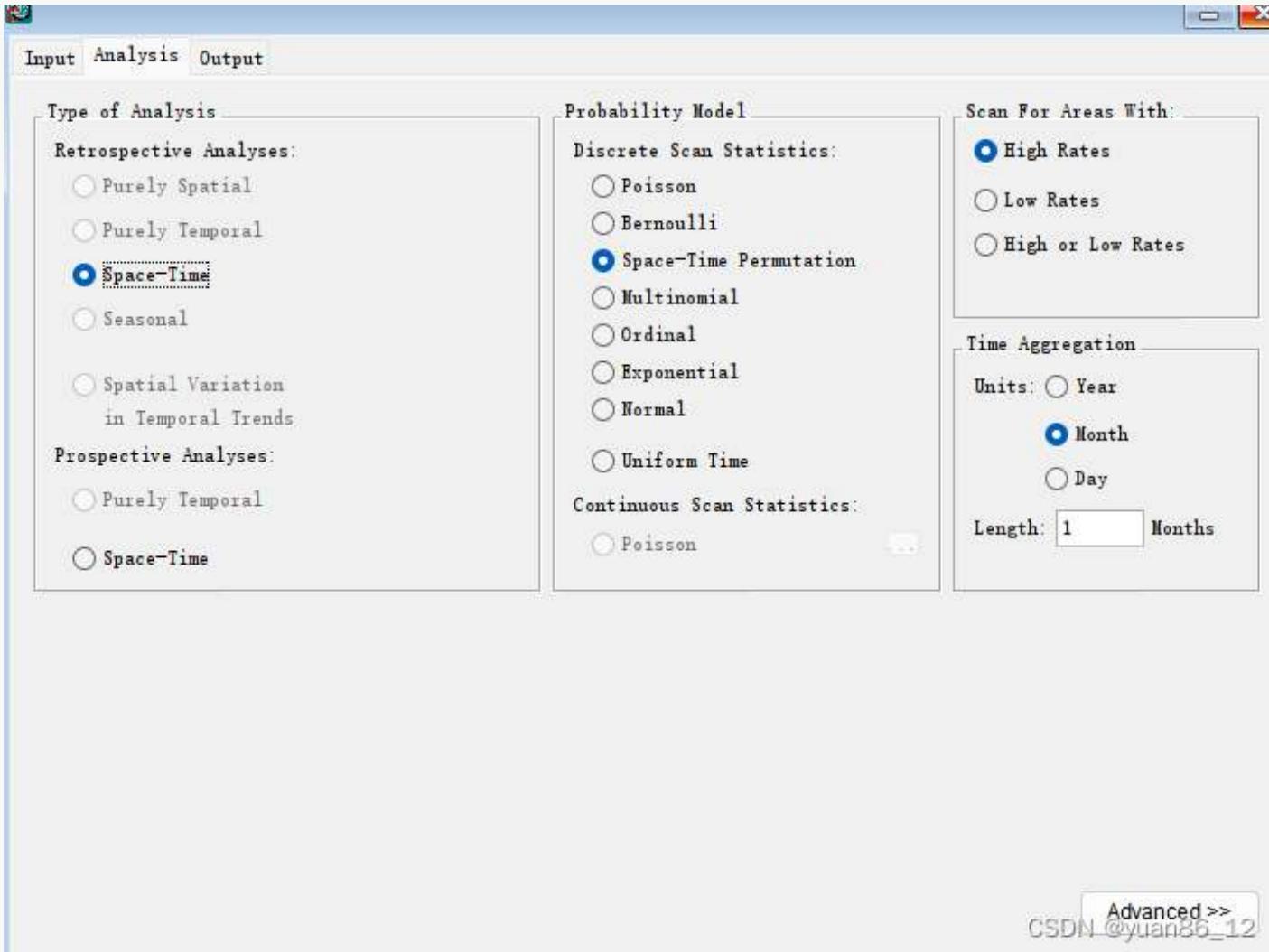
- 1 **Critical to disease surveillance**

- 2 **>1.6 million ELRs ingested into surveillance system so far in 2025**

- 3 **830 unique lab connections into surveillance system**

- 4 **>420K disease incidents created by ELRs in surveillance system so far in 2025 (excl. COVID)**

What is SaTScan?



Open-source tool to analyze spatial, temporal, and space-time data

Designed for public health and epidemiologists

Identifies clusters of cases in space and time; determines if differences over time are statistically significant.

How do we leverage SaTScan for ELR monitoring?

Laboratory facilities are reconceptualized as “spaces” for the prospective space-time permutation scan statistic.

To detect unusual drops in reporting ELR volume by facility and by disease.

Adapted methodology used by NYC’s team and expanded:

- Increased sensitivity for some diseases
- Checking by disease vs. all labs

How is SaTScan set up for ELR volume monitoring?

- 1 Part of volume monitoring (with zero submissions and turnaround time reports)
- 2 Limited to higher volume diseases (22 total) among higher volume senders
- 3 Monitored every weekday

How is SaTScan set up for ELR volume monitoring?

- 1 Diseases are parameterized (differentiated between higher vs. lower volume senders)
- 2 Run in R through an installed rsatscan package
- 3 Scheduled R scripts prepare input files and exports data into a dashboard

ELR Monitoring Dashboard

SaTScan Volume Monitoring [ⓘ](#)
The SaTScan analysis study period is 08/11/2024 to 08/11/2025. [ⓘ](#)

[Sender View](#) [Disease View](#)

Overview of All Senders

600
Senders Analyzed

20
Flagged

23
Watched

0
Ignored, Flagged

Flag Summary by Sender and Disease

Select a Sender [ⓘ](#)

Select a Disease [ⓘ](#)

Limit Senders
 Flagged Watched

use_lab_code	LDO_Disease_Code	lab_names	total_count	latest_elr	Signal	Analysis_Category
05D0930353	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	40808	2025-08-11	Flagged	All
05D2194942	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	34274	2025-05-19	Flagged	All
05D2228650	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	33275	2025-08-11	Flagged	All
05D2113673	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	23522	2025-07-28	Flagged	All
05D2147767	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	21997	2025-08-11	Flagged	All
05D0930143	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	18632	2025-08-11	Flagged	All
05D2284039	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	9560	2025-08-08	Flagged	All
05D2166864	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	9217	2025-08-03	Flagged	All
05D1049784	Chlamydia	Chlamydia (Chlamydia trachomatis)	5644	2025-08-09	Flagged	All
31D2053667	Covid19	COVID-19 (2019-nCoV) (2019-nCoV)	5302	2025-06-19	Flagged	All

Showing 1 to 10 of 21 entries

Previous [1](#) [2](#) [3](#) Next

ELR Monitoring Dashboard

SaTScan Volume Monitoring [①](#)
The SaTScan analysis study period is 08/11/2024 to 08/11/2025. [①](#)

[Sender View](#) [Disease View](#)

Select a Sender [①](#)
 All Senders

Select a Disease [①](#)
 Chlamydia

Select Time Period
 Daily Weekly

Select Date Type
 Received Collected

Select Date Range [①](#)
2025-05-07 to 2025-08-11

Limit Senders
 Flagged Watched

[Reset Filters](#) [Download](#)

Overview of Senders for Chlamydia

116 Senders Analyzed  1 Flagged  0 Watched  0 Ignored, Flagged 

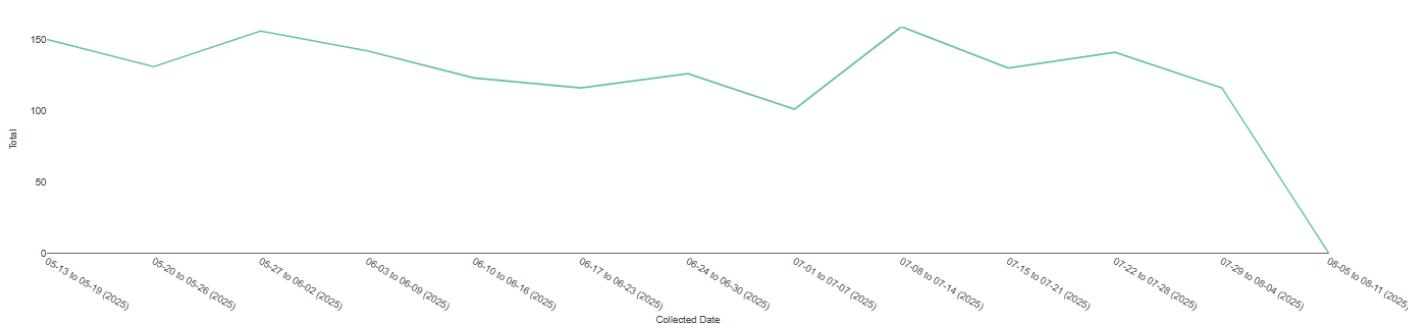
Weekly Deduplicated Counts by Status

Listing
Show 10 entries [Search](#)

lab_names	use_lab_code	LDO_Disease_Code	Signal	Analysis_Category	total	08-05 to 08-11 (2025)	07-29 to 08-04 (2025)	07-22 to 07-28 (2025)	07-15 to 07-21 (2025)	07-08 to 07-14 (2025)	07-01 to 07-07 (2025)	06-24 to 06-30 (2025)	06-17 to 06-23 (2025)	06-10 to 06-16 (2025)	06-03 to 06-09 (2025)	05-27 to 06-02 (2025)	05-20 to 05-26 (2025)	05-13 to 05-19 (2025)
Chlamydia	05D1049784	Chlamydia	Flagged	All	1591	0	116	141	130	159	101	126	116	123	142	156	131	

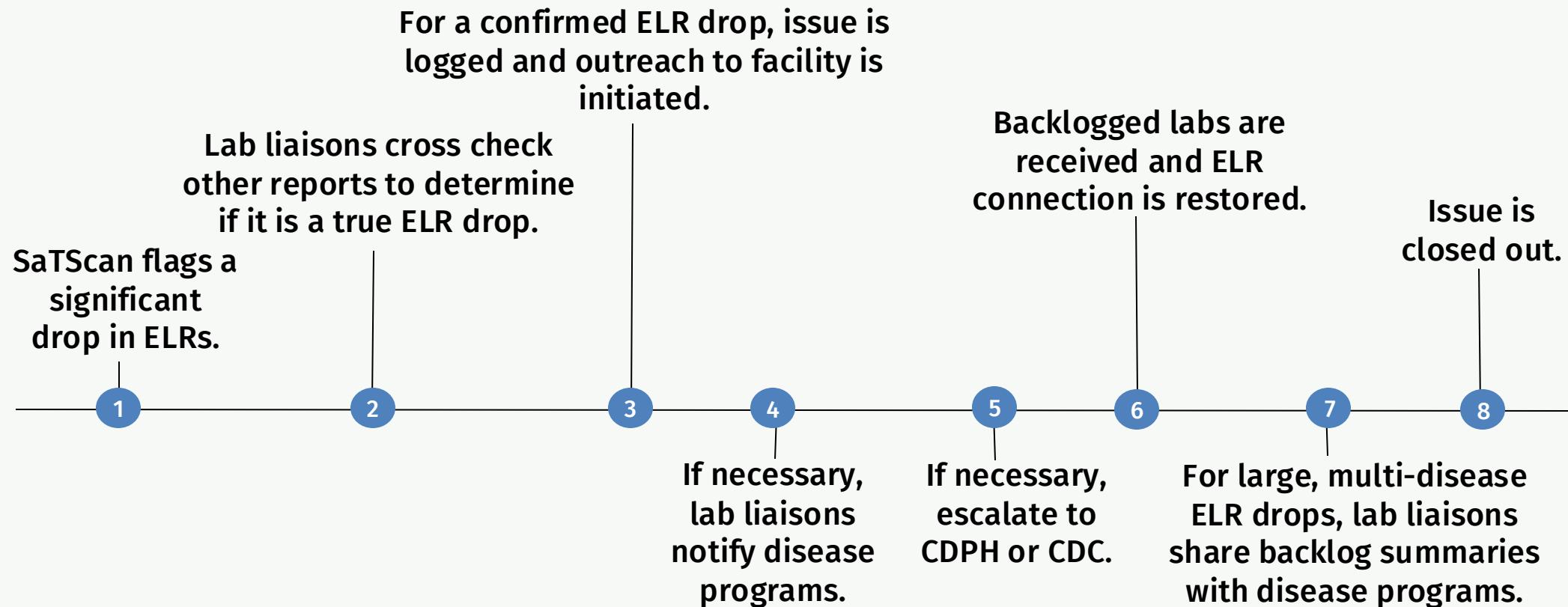
Showing 1 to 1 of 1 entries [Previous](#) [1](#) [Next](#)

Volume Distribution for Flagged Senders



COUNTY OF LOS ANGELES
Public Health

ELR Monitoring Workflow



Future Plans

- 1 **Expand to lower volume facilities and lower volume diseases**

- 2 **Further automate monitoring for efficient decision making**

- 3 **Continue to align monitoring to program priorities**

Acknowledgements

SaTScan Methods adapted from the Bureau of Communicable Disease at the New York City Department of Health and Mental Hygiene:

- Greene, S. K., Andrews, E. M., Evans Lloyd, P., Baumgartner, J., & Peterson, E. R. (2020). Detecting drop-offs in electronic laboratory reporting for communicable diseases in New York City. *Journal of Public Health Management and Practice*, 26(6), 570–580. <https://doi.org/10.1097/PHH.0000000000000969>
- GitHub Repo: https://github.com/CityOfNewYork/communicable-disease-surveillance-nycdohmh/blob/master/ELR_dropoffs/README_ELR_DROPOFFS.md

rsatscan package:

Kim, J., & Jung, I. (2020). *rsatscan: Tools, classes, and methods for interfacing with SaTScan stand-alone software* (R package version 0.3.9200) [Computer software]. Comprehensive R Archive Network (CRAN). <https://CRAN.R-project.org/package=rsatscan>



Thank you!

If you have more questions, email:
LabDataMonitoring@ph.lacounty.gov



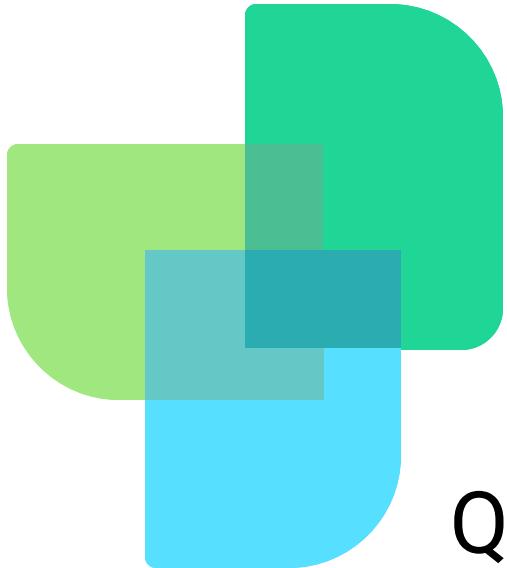


DEPARTMENT OF
PUBLIC HEALTH &
HUMAN SERVICES

Git'er done Montana Style: How GitLab Saves Our Code (and Our Sanity)



SHAPING TOMORROW'S PUBLIC HEALTH TODAY.



Pulse Check:

Quick show of hands, how many people are familiar with GitLab or GitHub?

**GitLab: when used to its full extent,
it is a DevOps platform that
enables:**

*Code
repository +
tracking*

Group collaboration

Pipeline development



Challenge

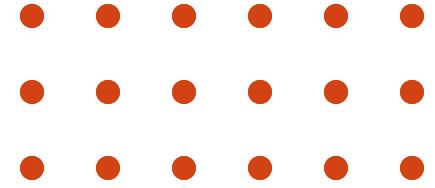


- Montana is a decentralized state (59 local and tribal public health departments)
- We have many core public health data to share: Behavioral Risk Factor Surveillance System (BRFSS); Vital Statistics; Communicable Disease data; Hospital Discharge; Syndromic Surveillance; Population Estimates
- Wanted to prevent the release of differential statistics while empowering public health professionals to perform independent data analysis

Opprotunity

- Enterprise GitLab is available within the State of Montana
- Enabled us to centrally store and utilize common analytic code
- Aligned with Data Modernization Efforts
 - Support for implementation
 - Able to leverage existing infrastructure/technology
 - Had an advanced GitLab user to act as the Champion





How we started

- Drafted how we wanted the Group organized
 - Enterprise → Agency → Division → Surveillance & Informatics
- Worked with our State IT
- Defined the governance and administration
 - How would access be requested, reviewed, granted?
 - How would we ensure proper management and utilization?
- Collated all that information into a handy Instruction manual
- Socialized the GitLab Group!



Enterprise / DPHHS / PHSD / mtdphhs-surveillance-informatics

M mtdphhs-surveillance-informatics

Recent activity Merge requests created Issues created Members added

Last 30 days 4 0 0

[Subgroups and projects](#) [Shared projects](#) [Shared groups](#) [Inactive](#)

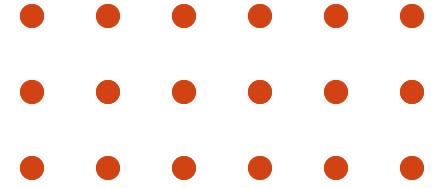


Subgroup/Project	Description	Owner	Rating
 B BRFSS 			
 E EMSTS Data 	This group is for datasets managed under EMSTS: EMS registry, Montana Trauma Registry, MT-VDRS and SUDORS		
 E ESSENCE 			
 I Injury and Overdose Indicators 	R and SAS code for Injury and Overdose CDC/CSTE indicators: Death & MHDD Data		
 M MHDD 			
 M MIDIS 			
 M Montana Population 			
 R R and SAS Coding Group 			
 V Vital Stats  Owner			
 E ELR Data Monitoring System 		 0	
 P Public Health Data Catalog 		 0	
 P Public Health Data for Montana Communities 		 0	

If you build it,



will they come?



Yes, And, we are still trying

- Utilization hasn't been what we had hoped
 - Currently have the "early adopters"
- Positive feedback from users
- Change management is hard
- Data Modernization "overwhelm"



Next Steps:

- Hands-on training
- More abbreviated instruction manual or short training tutorials
- GitLab is robust, so let's focus on the intended and immediate purpose
- Continue to socialize its use in our Montana Public Health Communities of Practice
- Consider the addition of more relevant code sets

Thank You!

jennifer.rico@mt.gov

Audience Q & A



Thank You!

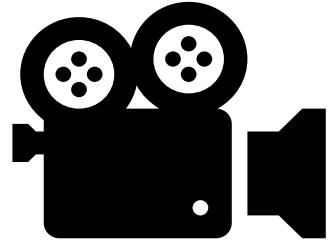
Up Next | Break

11am Central Time | Regency C Join us for our preconference closing plenary session –

Advancing Data Modernization Roadmaps with a Sustainability Lens

Share Your Story!

IC Program Interviews: Wave 1 Participants



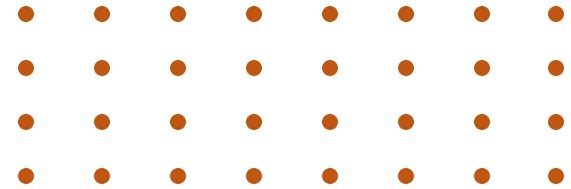
We Want to Hear from You!

Short, 5–7 minute interviews with
Wave 1 PHAs & IC Program partners

When: Mon 8/18 – Thurs 8/21
Where: Sterling 5 (2nd floor)

*Sign up by scanning the QR Code,
or come find us during a break!*





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