

COVID, and Monkeypox, and Environmental Threats, Oh My!

2:00 PM EST | December 7th, 2022 | 2022 SyS Symposium

Moderator:

- Michael Coletta, MPH – InductiveHealth Informatics LLC

Presenters:

- Brittany Eziam, MPH – Tennessee Department of Health
- Emma Price, VMD, MS – New Jersey Department of Health, CDC
- Laura Fox, MPH – Arizona Department of Health Services
- Chelsea Langer, PhD, MPH – New Mexico Department of Health



Council of State and Territorial Epidemiologists



Brittany Eziam, MPH
Tennessee Department of Health





Improving the Sensitivity of SARS-CoV-2 Related Hospitalization Reporting with Syndromic Surveillance Data

Brittany Eziam, MPH | Epidemiologist | December 7th, 2022

TN COVID Hospitalizations

March 1, 2020 – September 1, 2021

~5,100 previously unmatched COVID-related hospitalizations

24,694

Outline



Results



Background

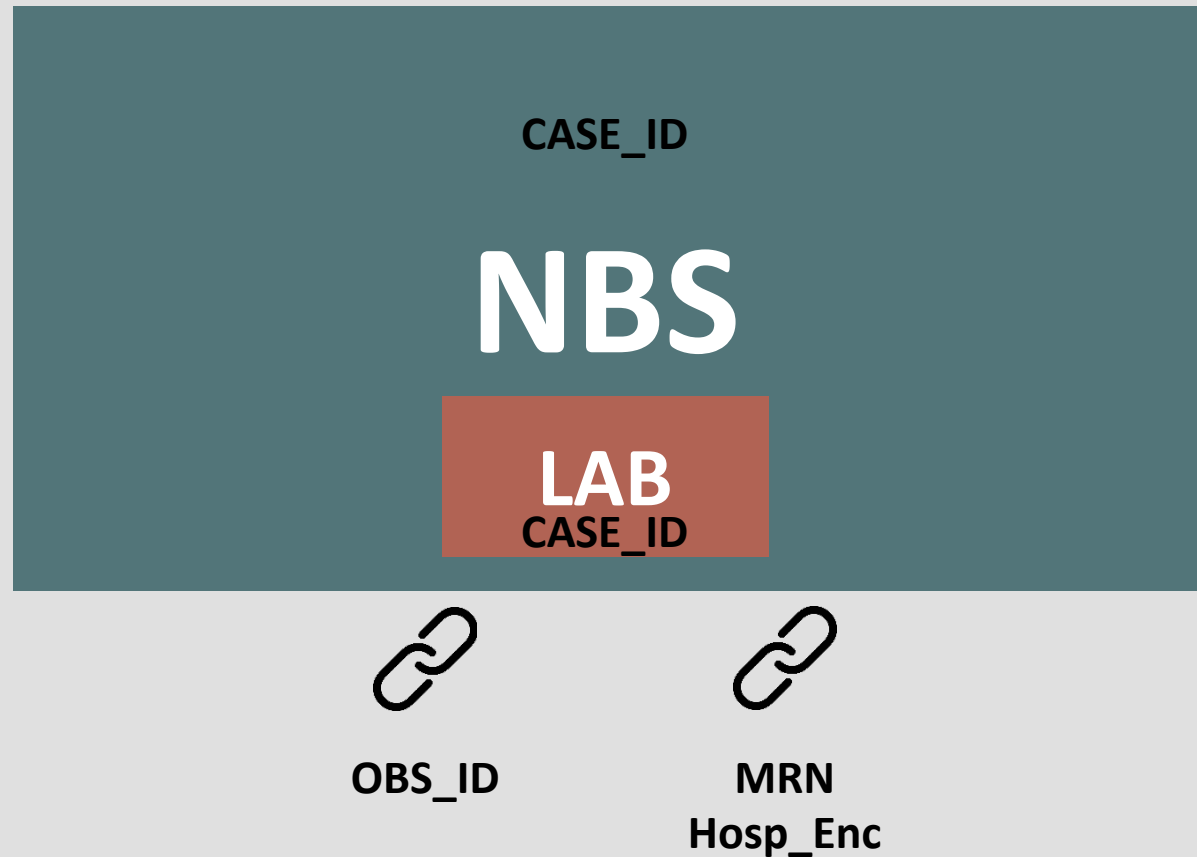
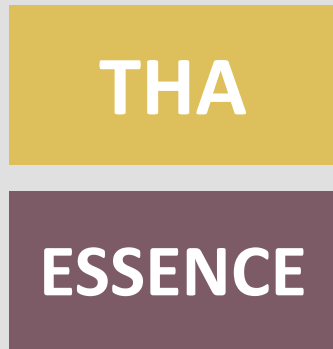


Methods



Conclusions

Background



Methods

THA (Hospitalizations)

**Mention of
COVID-19**

**Admission,
Diagnosis,
Procedure, &
Discharge Notes**

LAB (Laboratory Tests)

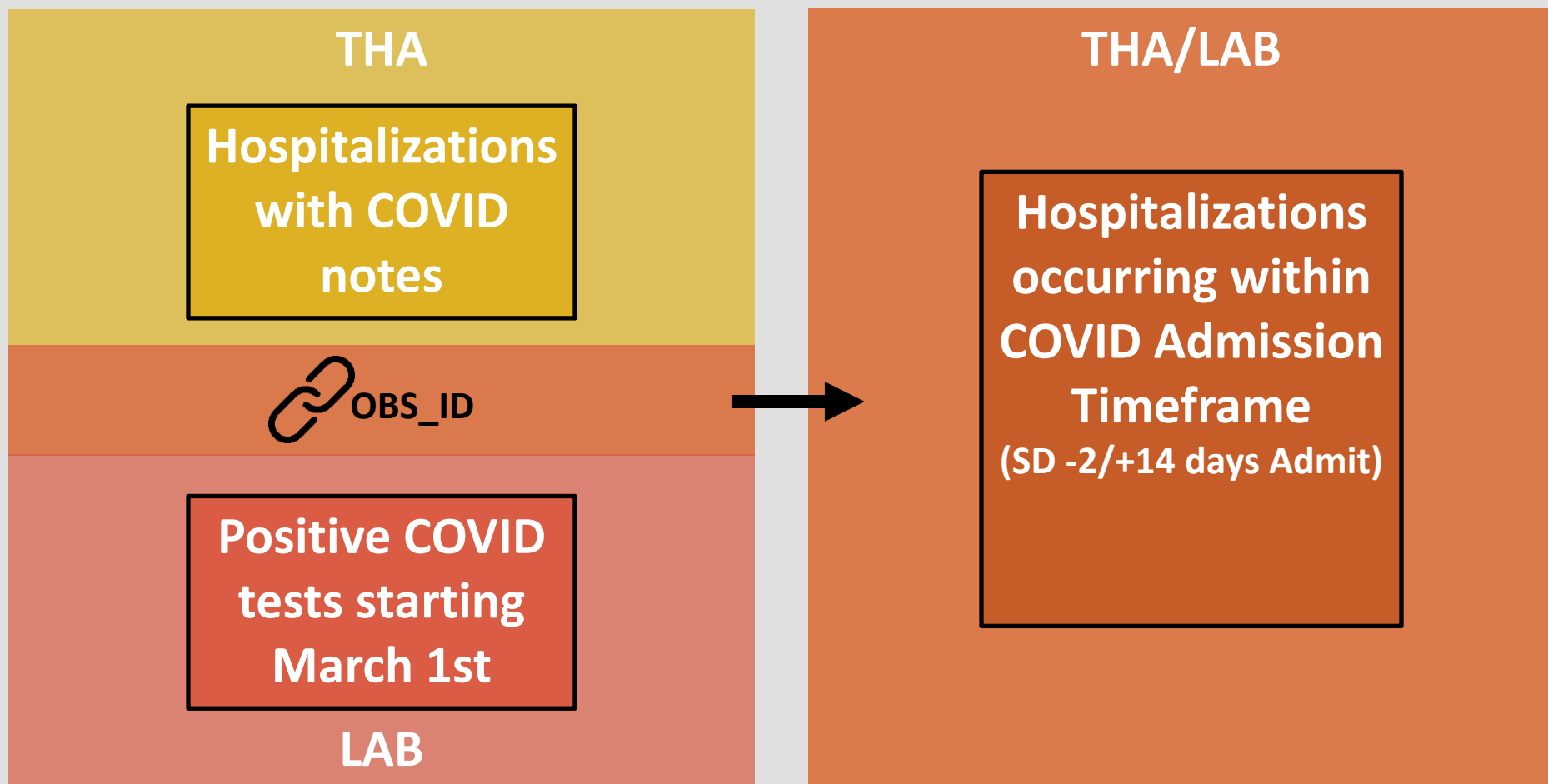
COVID Tests

Positive

PCR/Ant.

**SD
Mar 1**

Methods



Methods

THA/LAB

**COVID-19 Hospitalizations
(Newly Matched)**



CASE_ID

NBS

**COVID-19 Hospitalizations
(Previously Matched)**

***Flag cases as “In_NBS”**

Methods

Updated NBS

All Matched
COVID-19 Hospitalizations



MRN
Hosp_Enc

ESSENCE

COVID-19 Hospitalizations
Recorded in ESSENCE

COVID in
Chief_Complaint
or
Discharge_Diagnosis
U07.1, J12.82, B34.2
and
“Resp” syndrome in
Category_Flat

Conclusions

~5,100 newly matched hospitalizations

20% increase in total number of hospitalizations reported

Awareness of the higher incidence of severe COVID outcomes

24,694

Conclusions

- Limitations
 - Misspellings
 - Coding errors
- Advantages
 - Identifies additional cases daily
 - Prevent future backlogs
 - Additional use cases → breakthrough cases
 - Maintain essential partnerships with statewide entities

Acknowledgements





Thank You



Emma Price, VMD, MS
New Jersey Department of Health,
CDC



Using Syndromic Surveillance to Identify Patients — Monkeypox New Jersey, May – September 2022

Emma Price VMD, MS
Epidemic Intelligence Service Officer
New Jersey Department of Health

O	E	A	I	O	E	X	P	M	N	V	O	Y	M
M	O	N	K	E	Y	P	O	X	O	S	E	T	O
K	S	L	K	F	E	V	E	R	M	E	N	E	N
A	C	H	S	V	K	A	H	T	R	P	P	S	K
N	O	E	X	E	E	E	C	M	A	V	X	T	Y
P	S	K	O	M	V	R	T	O	S	O	L	E	K
P	X	R	P	X	X	F	E	P	H	E	N	O	M
X	X	R	N	O	P	N	M	M	S	R	E	C	L
H	K	X	E	O	O	S	R	I	P	O	O	O	N
O	F	M	K	N	A	N	O	Y	S	O	I	N	M
K	E	N	C	C	I	N	X	X	A	O	X	C	H
N	O	M	I	C	H	T	O	C	B	P	X	E	N
I	E	E	H	O	E	C	O	S	C	A	B	R	M
X	N	B	C	V	O	S	O	C	E	E	S	N	O

Key message: Monkeypox syndromic surveillance may detect **public concern**





Monkeypox has
changed in geography
& transmission.

Monkeypox cases currently detected by **PCR testing** in New Jersey.



CDRSS

Lesions are **swabbed** and
submitted for orthopoxvirus
PCR testing

Communicable Disease Reporting
and Surveillance System



Syndromic surveillance could help identify **additional cases** and inform the scope of the outbreak

Compare patient characteristics from:

Syndromic
surveillance
**Emergency
Department visits**

**CDRSS laboratory
confirmed cases**

New Jersey Department of Health syndromic surveillance data flow

Patient seeks care at Emergency Department & visit details recorded in electronic medical record



New Jersey Department of Health syndromic surveillance data flow

Deidentified medical record data sent to EpiCenter & searched for key word **“monkeypox”** in chief complaint & medical note, or monkeypox ICD-10 code



New Jersey Department of Health syndromic surveillance data flow

Monkeypox visit details analyzed by New Jersey Department of Health



Methods

Descriptive analysis of
monkeypox **ED visits** with **PCR**
confirmed cases in CDRSS
(May 1 – Sept 15, 2022)



Number of patients identified by surveillance system

714



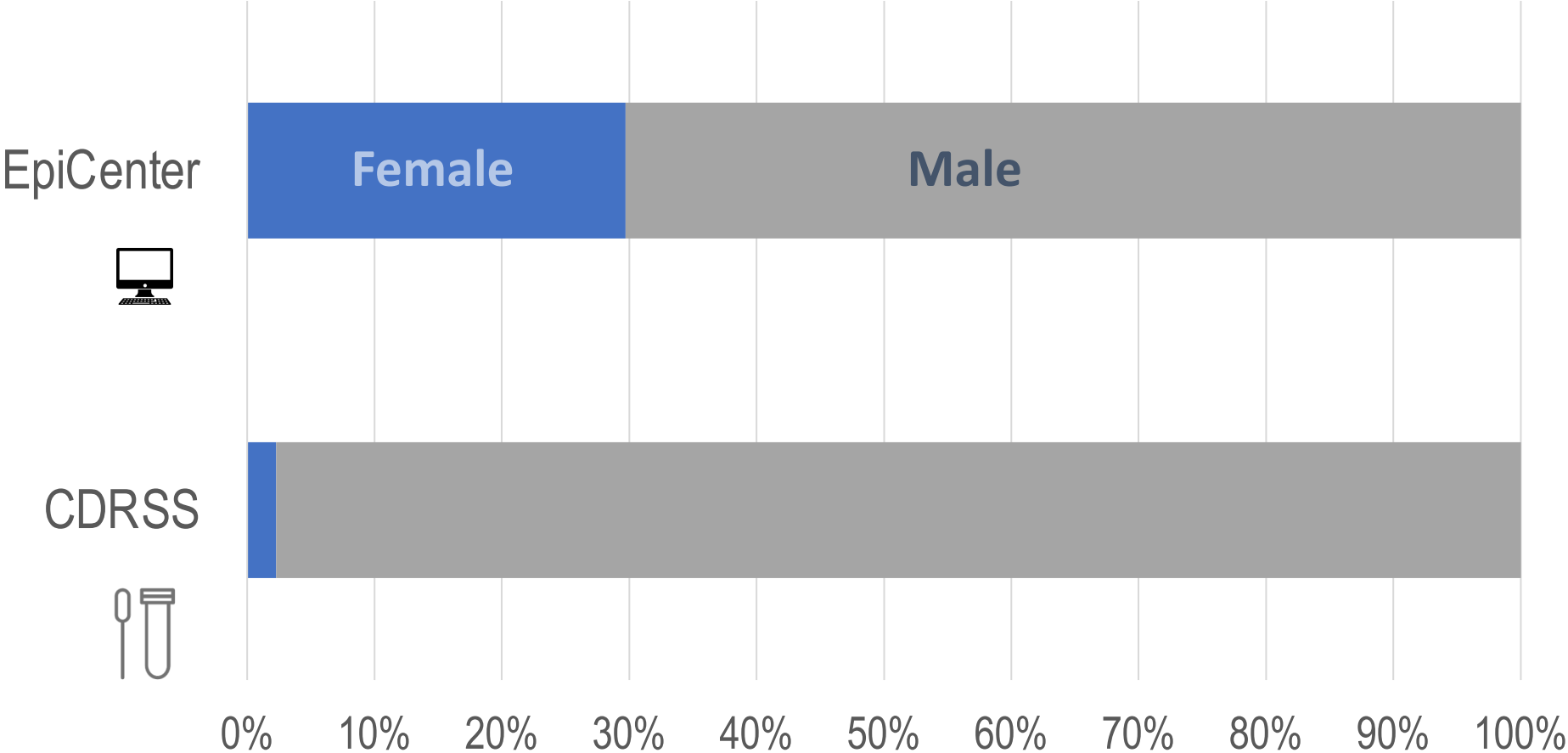
EpiCenter
(monkeypox mention
in medical records)

610

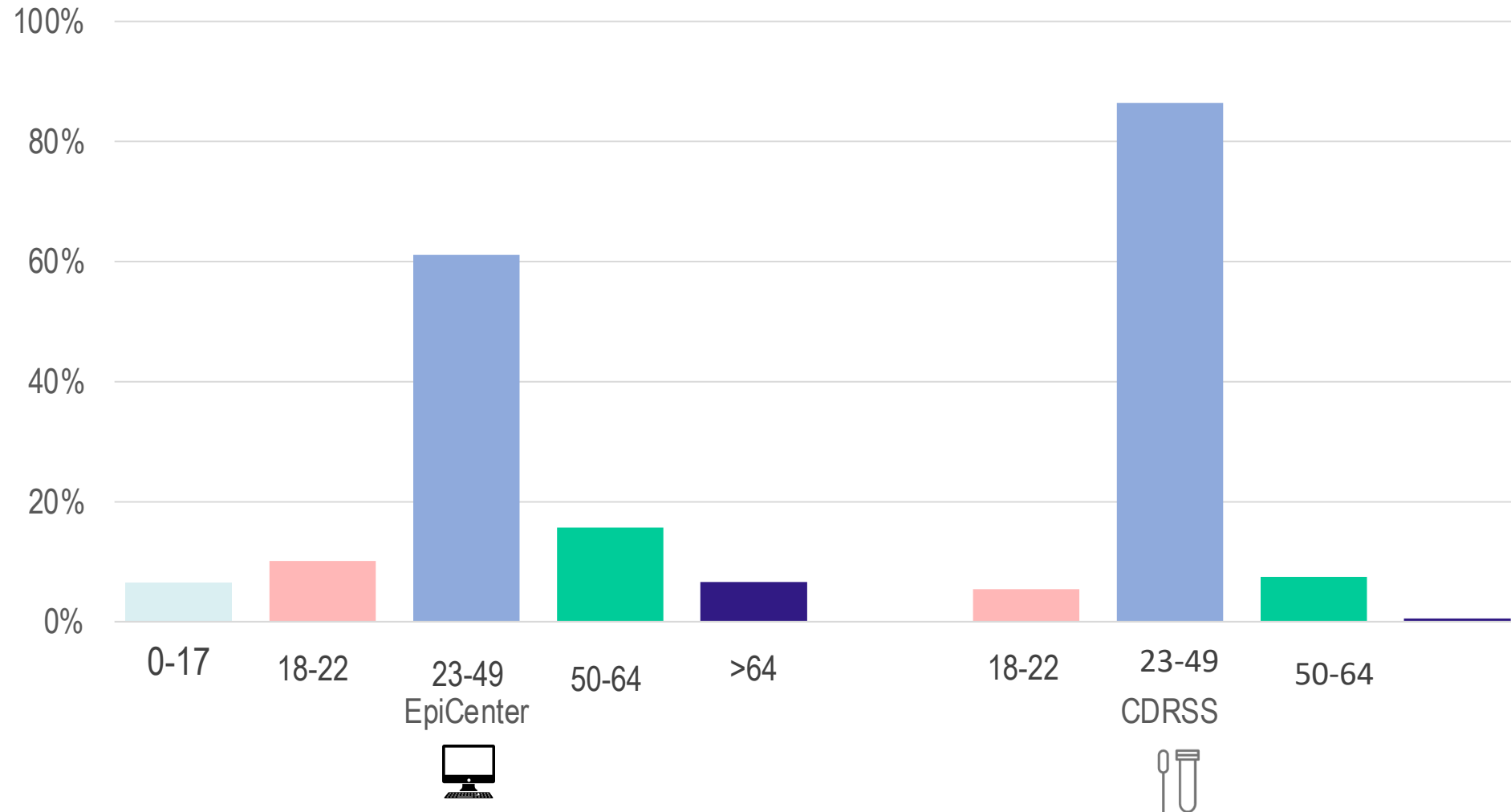


CDRSS
(PCR confirmed
cases)

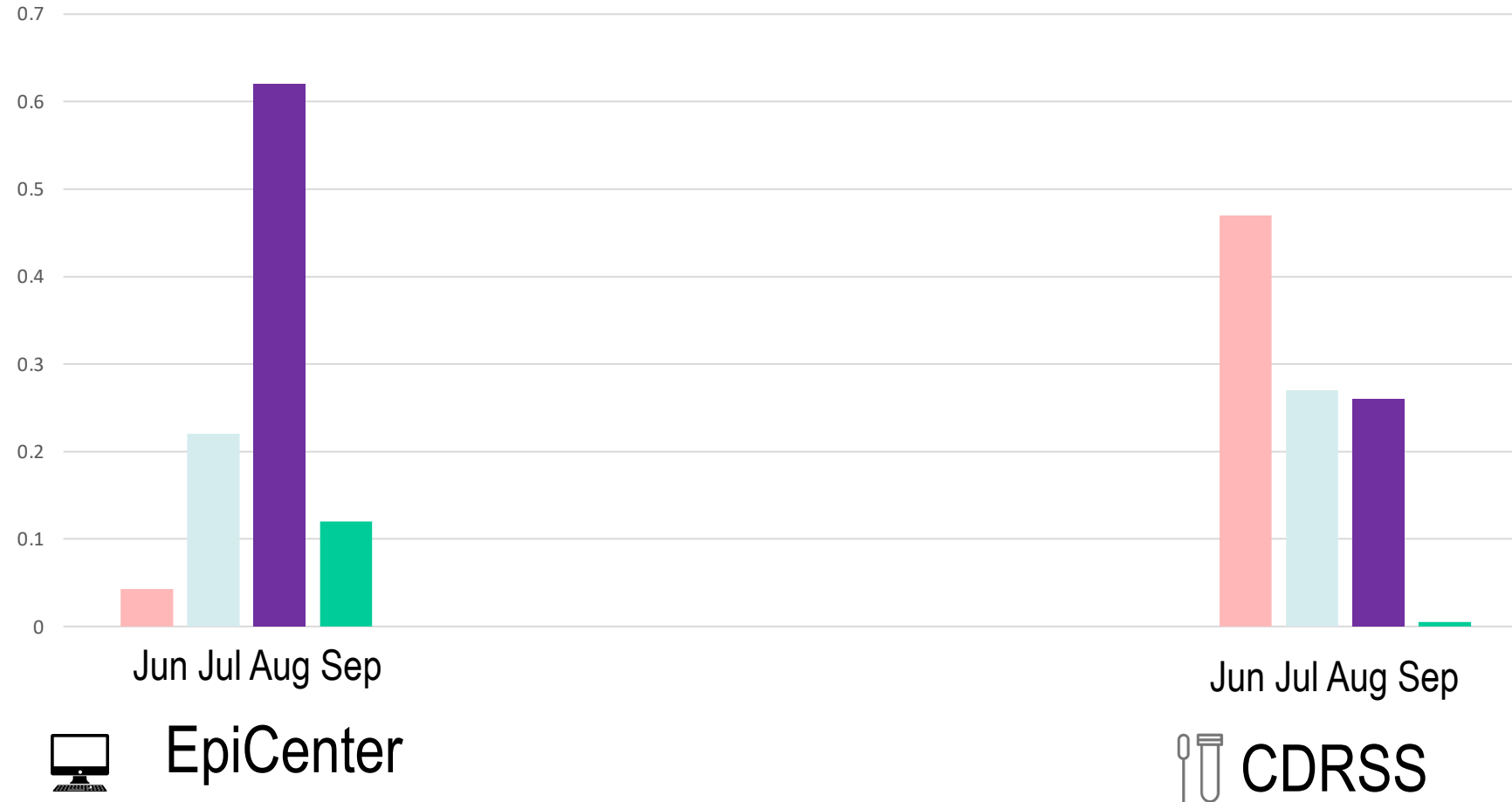
Sex distribution in ED visits and PCR confirmed



Wider age range for ED visit patients compared with PCR confirmed

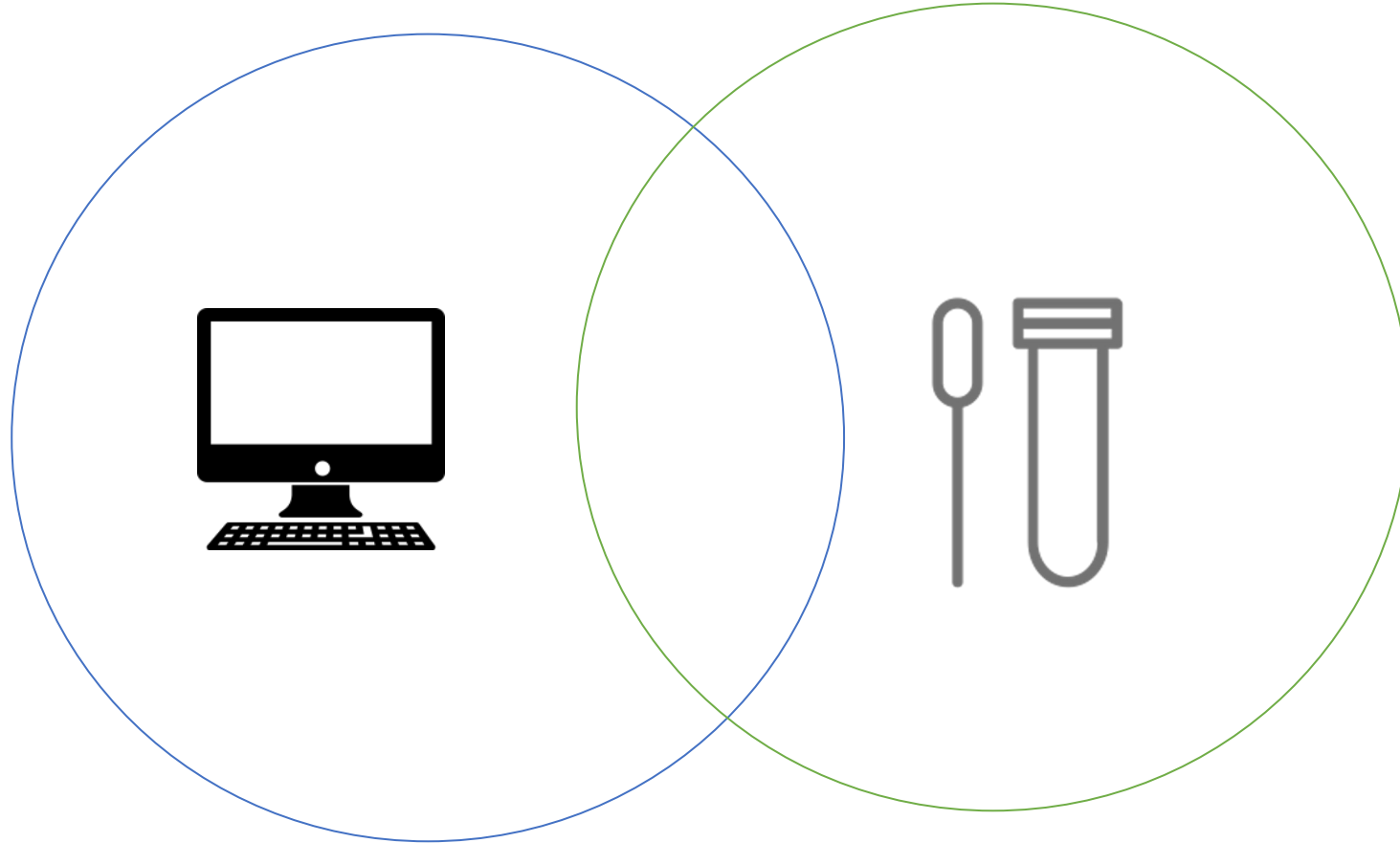


Proportion of patients with monkeypox by month



EpiCenter and CDRSS select patients differently

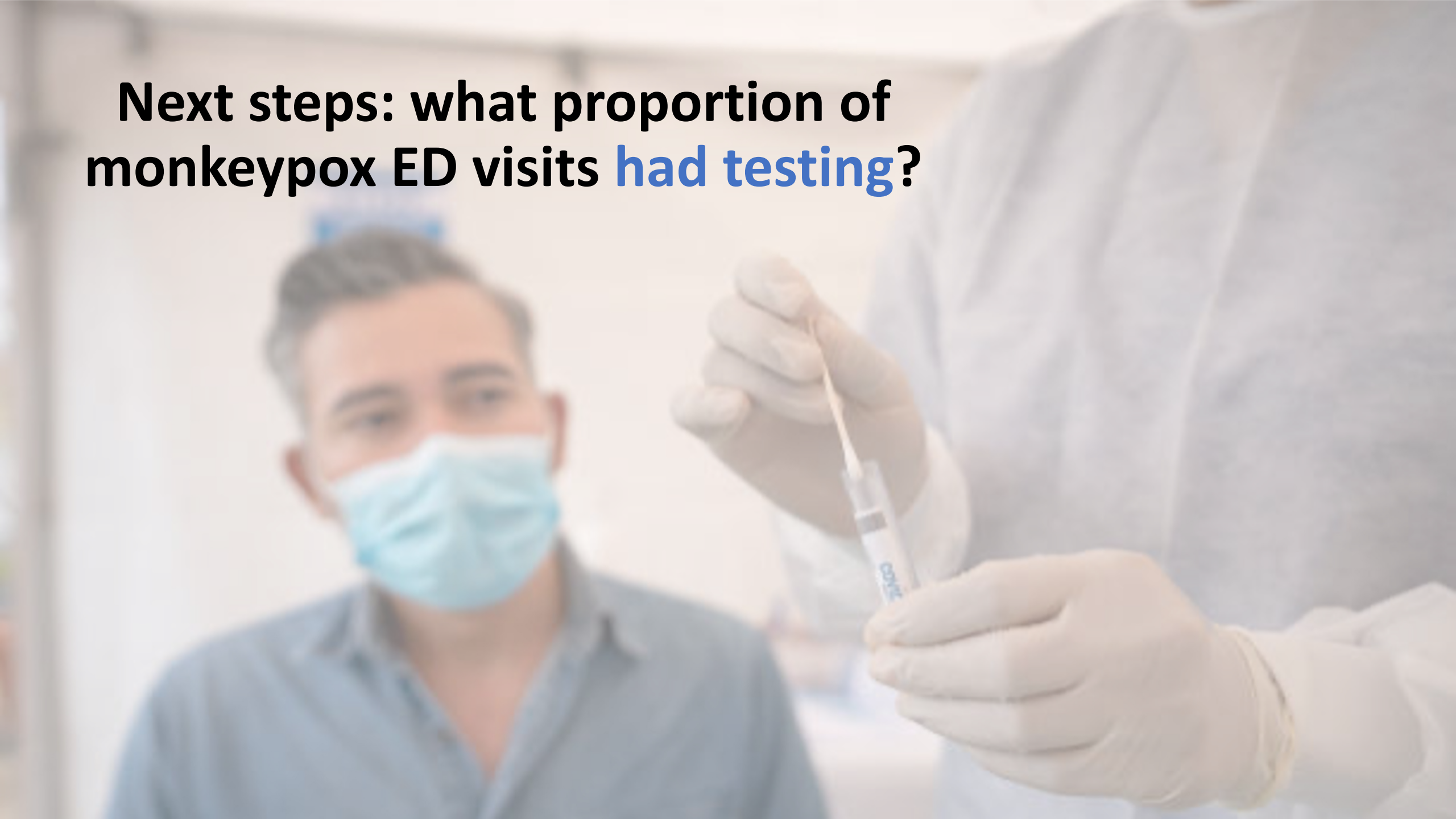
Some patients may not overlap between the two systems



Monkeypox syndromic surveillance may detect **public concern**.



**Next steps: what proportion of
monkeypox ED visits **had testing?****



Christina Tan, MD, MPH

Barbara Montana, MD, MPH, FACP

Stella Tsai, PhD, CIH

Edward Lifshitz, MD, FACP

Darby McDermott, DVM, MPH

Bruce Gutelius, MD, MPH

Thank you!

A close-up, slightly blurred image of a hand holding a dark-colored fountain pen. The pen is positioned as if it has just finished writing or is about to write. The background is a soft, light blue gradient. The words 'Thank you!' are written in a flowing, cursive script in a darker blue color, appearing to be on a piece of paper or a screen.



Laura Fox, MPH – Arizona Department of Health Services

Chelsea Langer, PhD, MPH – New Mexico Department of Health



Exploring Use of Syndromic Data in Environmental Public Health Tracking

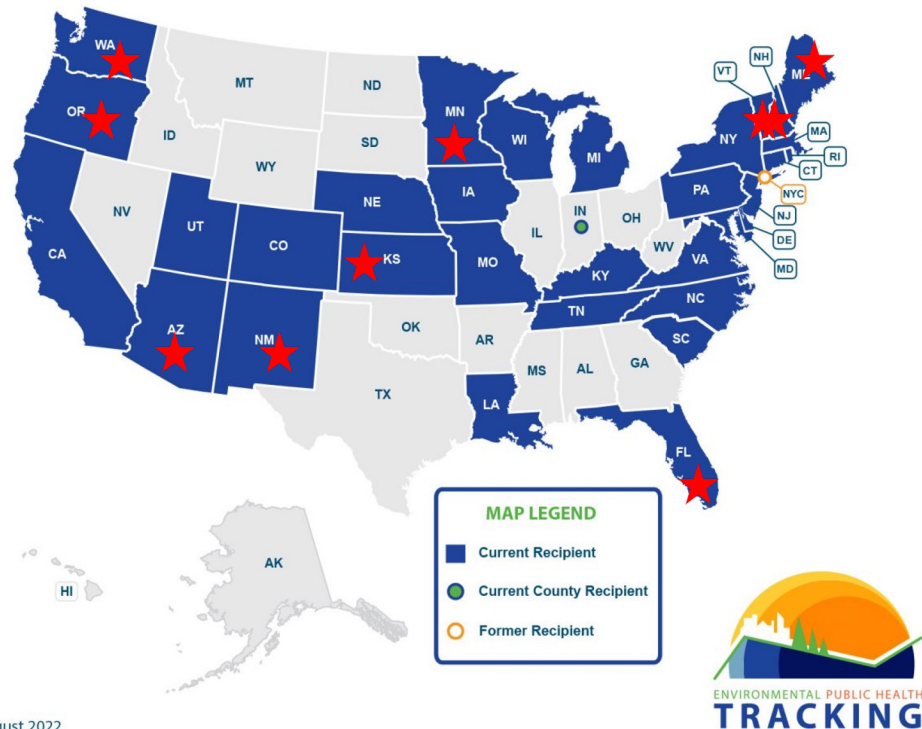
Presenting to 2022 NSSP Syndromic Surveillance Symposium

Authors: Laura Fox¹, Chelsea Langer², Victoria Clemons^{3,4}, Carol Trenga³, Wendy Blackman⁵, Katie McDaniel⁶, Nicole Karlsson⁷, Jessica Bonthius⁸, and Mikyong Shin⁹

¹Arizona Department of Health Services, ²New Mexico Department of Health, ³Oregon Health Authority, ⁴CSTE Applied Epidemiology Fellow, ⁵Vermont Department of Health, ⁶Florida Department of Health, ⁷New Hampshire Department of Health and Human Services, ⁸Maine Center for Disease Control and Prevention and ⁹CDC Environmental Public Health Tracking Program

The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

CDC's National Environmental Public Health Tracking Program



August 2022

★ Subteam members

The National Environmental Public Health Tracking Network brings together health data and environmental data from national, state, and city sources and provides supporting information to make data easier to understand. The Tracking Network has data and information on environments and hazards, health effects, and population health.

Group Goals

- Examine the data quality of syndromic surveillance data captured in ESSENCE; and
 - Examine the strengths and limitations between ED visit data from ESSENCE and hospital discharge data for asthma and heat-related illnesses.
-

Methods

1. Identified two ESSENCE query definitions per health condition
2. Analysis strategy:
 - a. Positive predictive value (PPV)
 - b. Pearson's correlation coefficient (r) between data sources and queries
 - c. Daily temporal trend analysis between data sources
3. Developed data pull guidance and sample SAS code
4. Subteam members completed data analysis and shared results with group



Heat-related Illness: ESSENCE Queries

ESSENCE Filter	Query 1	Query 2	ED Data (following NCDM guidelines)
Data Source	Facility Location (full details)	Facility Location (full details)	Inpatient and Outpatient Data sources for ED Visits
Year(s)	2018, 2019	2018, 2019	2018, 2019
Months	May 1 – Sept 30 (by admission date)	May 1 – Sept 30 (by admission date)	May 1 – Sept 30 (by admission date)
Has Been Emergency	Yes	Yes	ED Visits Only
Patient Location (proxy for patient residence)	Yes/No	Yes/No	State residents
CCDD Category	CCDD Heat Illness V2	None	
Discharge Diagnosis (ICD-10)		T67, X30, X32, not W92	T67, X30, X32, not W92
Has Been Outpatient	No (if applicable)	No (if applicable)	

PPV values ranged from 60-84% for Query 1

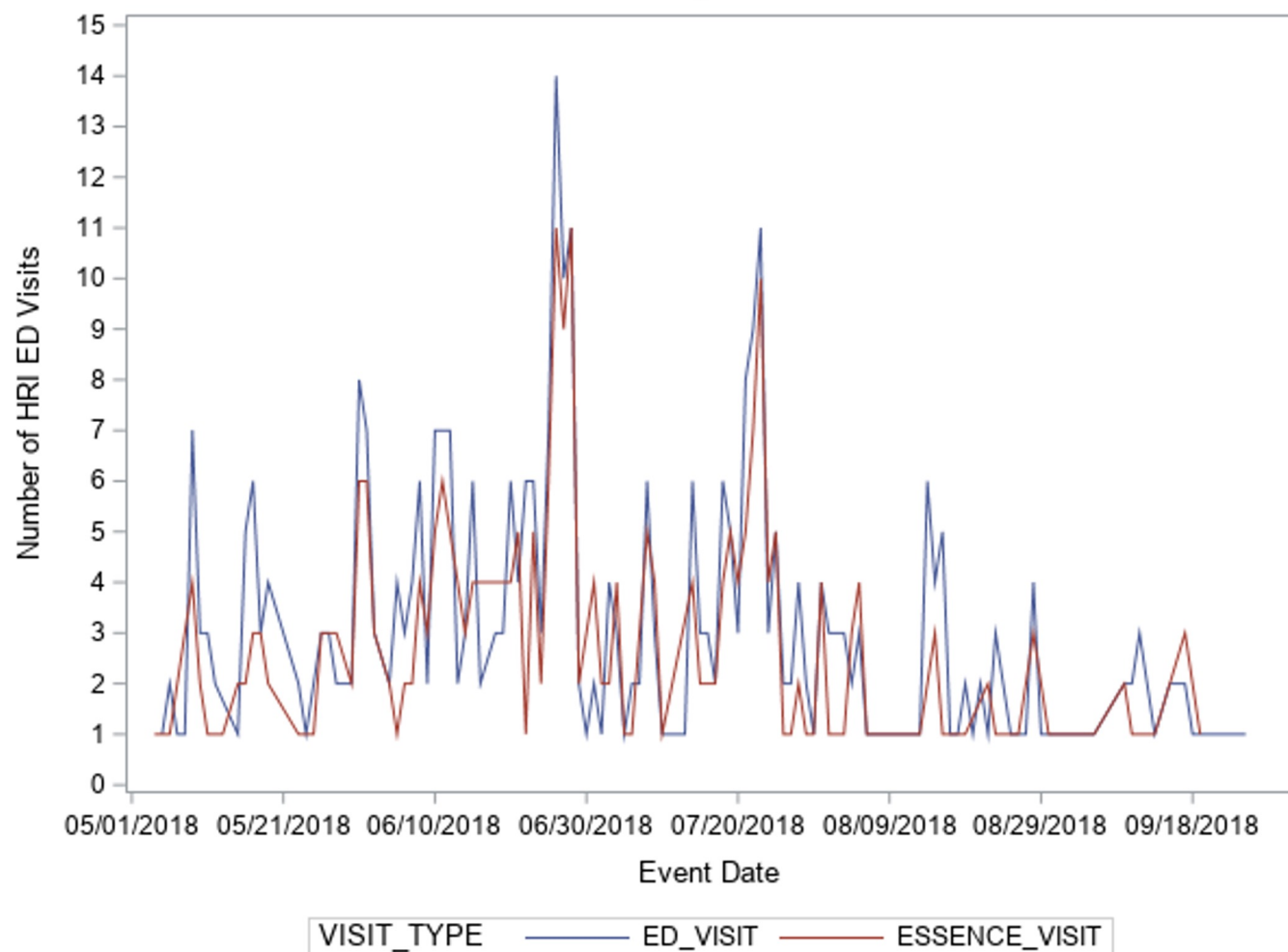
Heat-Related Illness Query 1 Positive Predictive Values, by State and Year			
State	Year		
	2018	2019	2020
AZ	64%	67%	67%
KS	63%	71%	
NH	71%	84%	
NM	74%	75%	75%
OR	76%	71%	73%
VT	63%	60%	

Query 1 & 2 ranged from $r = 0.78-0.98$

Pearson's Correlation Coefficient for ESSENCE Query 1 vs HRI NCDM ED Visits, by State and Year						
State	2018		2019		2020	
	r	p-value	r	p-value	r	p-value
AZ	0.92	<0.001	0.93	<0.001	0.92	<0.001
KS	0.94	<0.001	0.95	<0.001		
NM	0.84	<0.001	0.78	<0.001		
OR	0.96	<0.001	0.98	<0.001	0.95	<0.001

Pearson's Correlation Coefficient for ESSENCE Query 2 vs HRI NCDM ED Visits, by State and Year						
State	2018		2019		2020	
	r	p-value	r	p-value	r	p-value
AZ	0.92	<0.001	0.93	<0.001	0.94	<0.001
KS	0.86	<0.001	0.94	<0.001		
NM	0.85	<0.001	0.83	<0.001		
OR	0.98	<0.001	0.98	<0.001	0.95	<0.001

Time Series of ESSENCE Query 2 vs NCDM HRI ED Visits, 2018



Asthma: ESSENCE Queries

ESSENCE Query Filters	Query 1	Query 2	HDD (following NCDM guidelines)
Data Source	Facility Location (full details)	Facility Location (full details)	Inpatient & Outpatient data sources for ED visits
Year(s)	2018, 2019	2018, 2019	2018, 2019
Months	All	All	All
Has Been Emergency	Yes	Yes	ED visits only
Patient Location (proxy for patient residence)	Yes	Yes	State residents
CCDD Category	CDC Asthma V1	None	
Discharge Diagnosis (ICD-10)	None	J45	J45* in primary diagnosis field
Has Been Outpatient	No	No	
Examine by Age Groups	A: 0-17, 18+ years B: 0-4, 5-17, 18-64, 65+	Either option A/B	A: 0-17, 18+ years B: 0-4, 5-17, 18-64, 65+

PPV values of Q1 ranged from 87 – 97%

Asthma Query 1 Positive Predictive Values, by State and Year			
State	Year		
	2018	2019	2020
AZ	87%	89%	89%
KS	85%	95.6%	96.9%
NM	97%	96%	
OR	96.5%	96.9%	97.4%
VT	92%	88%	

Correlation coefficients of Q1 vs. NCDM was highest in 2020

Correlation Coefficient for Asthma ESSENCE Q1 vs NCDM ED Visits by State and Year, Daily Counts			
State	2018	2019	2020
	<i>r</i>	<i>r</i>	<i>r</i>
AZ	0.69	0.38	0.85
KS	0.34	0.55	0.67
ME	0.59*		
OR	0.58	0.67	0.79

*Maine calculated *r* combines years 2018-2019

Correlation coefficient was strongest for < 18 yr group

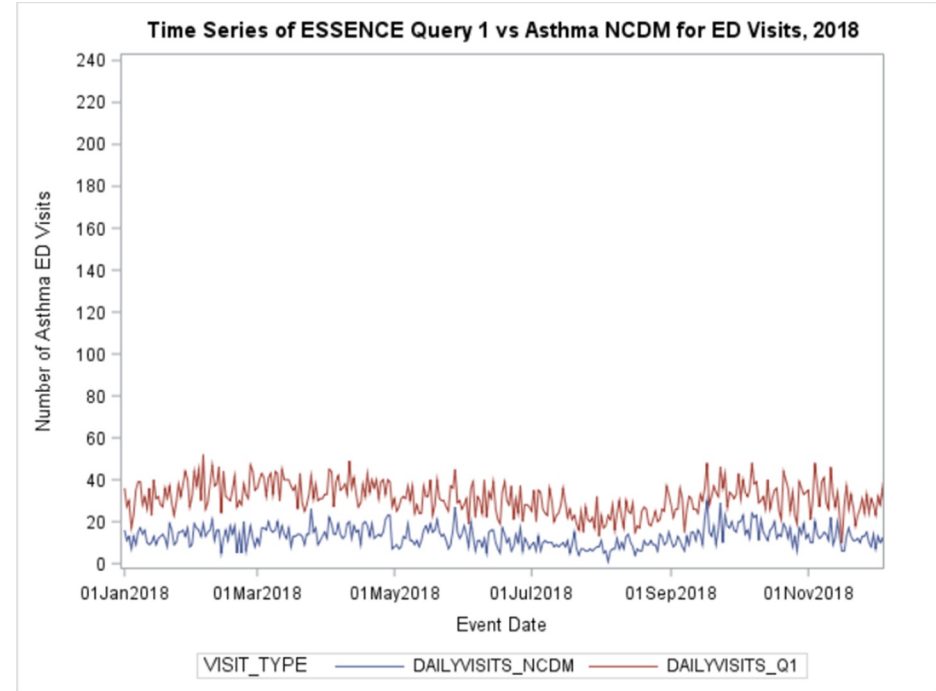
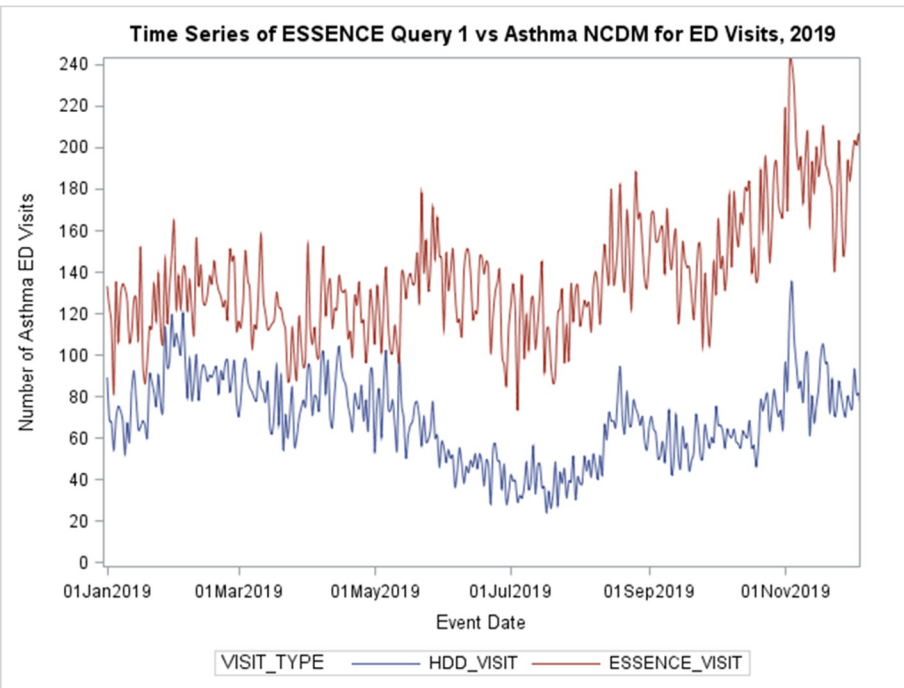
Correlation Coefficient for Asthma ESSENCE Q1 vs NCDM ED Visits by State, Year and Age Group A, Daily Counts

State	2018		2019		2020	
	0-17	18+	0-17	18+	0-17	18+
AZ	0.86	0.62	0.78	0.19	0.95	0.70
KS	0.49	0.15	0.56	0.22	0.58	0.14
NM	0.60	0.57	0.63	0.18		

Correlation Coefficient for Asthma ESSENCE Q1 vs NCDM ED Visits by State, Year and Age Group B, Daily Counts

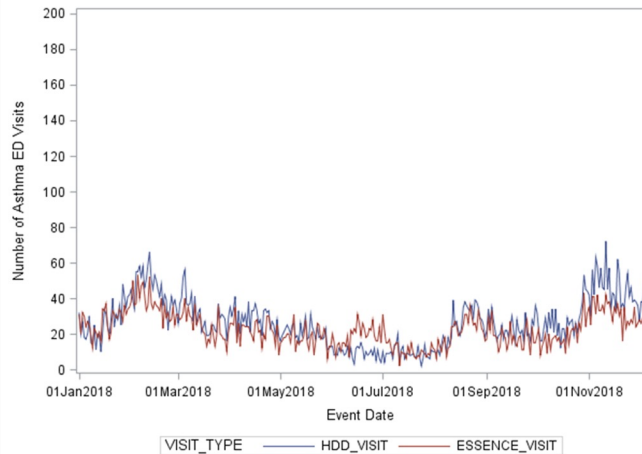
State	2018				2019				2020			
	0-4	5-17	18-64	65+	0-4	5-17	18-64	65+	0-4	5-17	18-64	65+
AZ	0.69	0.85	0.58	0.50	0.65	0.76	0.22	0.14	0.83	0.93	0.71	0.52
KS	0.14	0.48	0.14	0.14	0.27	0.49	0.21	0.09	0.27	0.51	0.11	0.19
NM	0.47	0.58	0.54	0.39	0.44	0.56	0.23	0.22				

Asthma Syndrome Query identified more ED Visits

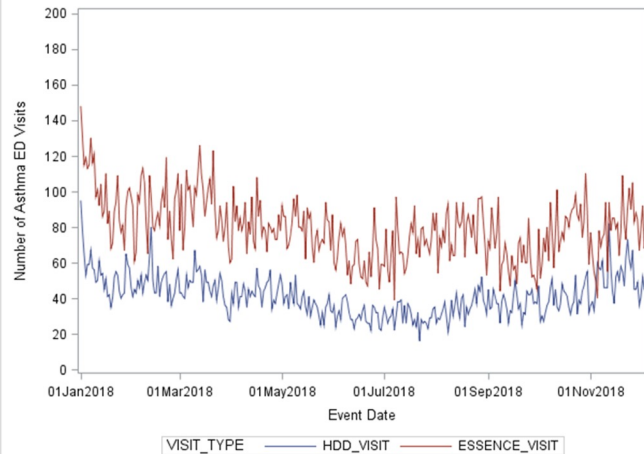


Difference
between
data
sources
most
pronounced
in 18+ yrs
group

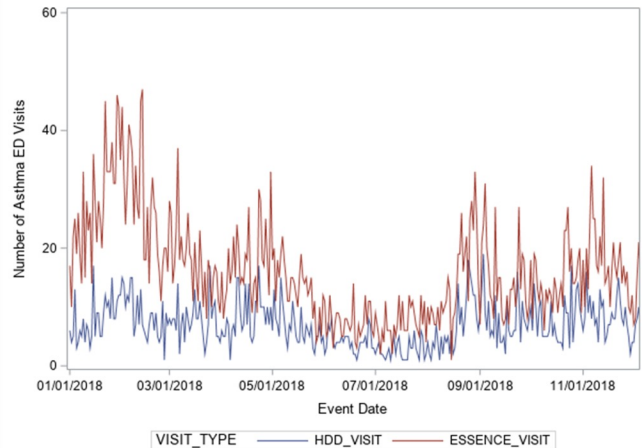
Time Series of ESSENCE Query 1 vs Asthma NCDM for ED Visits, 2018, Age Group = <18 Years



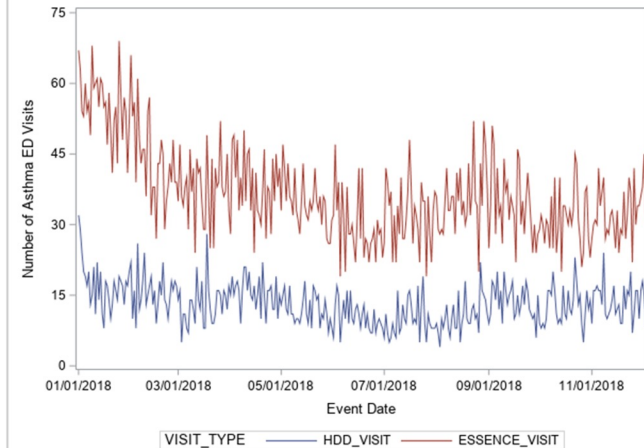
Time Series of ESSENCE Query 1 vs Asthma NCDM for ED Visits, 2018, Age Group = 18+ Years



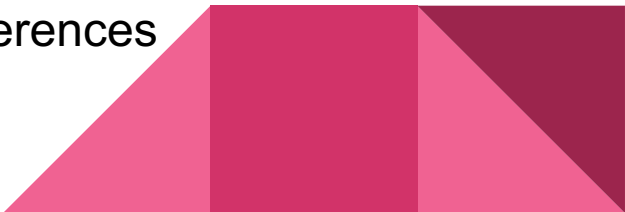
Time Series of ESSENCE Query 1 vs Asthma NCDM for ED Visits, 2018, Age Group = <18 Years



Time Series of ESSENCE Query 1 vs Asthma NCDM for ED Visits, 2018, Age Group = 18+ Years



Limitations

- Analyses varied somewhat by state and are dependent on:
 - Percent of facilities submitting data to NSSP ESSENCE or state SyS program
 - Quality and availability of SyS data
 - Availability of admission date in the hospital discharge dataset
 - Applicable state laws that may restrict or limit the use of SyS data
 - SyS DD ICD-10 codes do not distinguish between primary and secondary diagnoses
 - NCDM definition for asthma requires J45* as primary diagnosis only
 - False positives in SyS queries not explored as part of this time-limited collaboration
 - Analyses were complicated for states examining differences between ESSENCE and NCDM in 2020
- 

Conclusions and Next Steps

- CCDD “HRI v2” definition performs well for the states involved in this analysis
- CCDD “CDC Asthma v1” definition does not closely align with Tracking NCDMs
- Asthma syndrome definition should be further refined for age grouping specific analyses, such as children vs. adults
- Continue exploratory work examining syndromic data and uses for Tracking in new grant cycle



Acknowledgements

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State partners:

Arizona Syndromic Surveillance Program
Florida Department of Health Office of Public Health Research
Maine Department of Health and Human Services
New Hampshire Environmental Public Health Tracking Program
New Hampshire Public Health Emergency Preparedness Surveillance Program
New Mexico Department of Health EPHT and Asthma Control Program
Oregon Health Authority and Oregon Environmental Public Health Tracking Program
Vermont Department of Health Division of Environmental Health and Division of Health Statistics and Informatics



Contact Information

Information on data pull and analysis guidance:

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Questions about next steps:

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National Environmental Public Health Tracking:

<https://www.cdc.gov/nceh/tracking/>

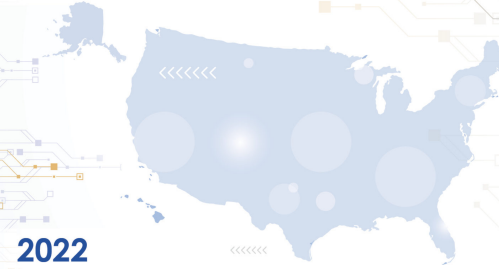


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National Syndromic Surveillance Program

Community of Practice

Resources that Advance the Science and
Practice of Syndromic Surveillance



2022

Syndromic Surveillance Symposium

December 6–8, 2022



KAHUIINA
CONSULTING