

Overdose Surveillance to Action

4:15PM EST | November 16th, 2021 | 2021 SyS Symposium

Moderator: Michael Coletta, MPH – CDC/NCIPC

Presenters:

Shahnaj Binte Safi, MBBS, MPH – CSTE/NMDOH

Scott M. Johnston, MPH – Kansas Department of Health and Environment

Malathi Aarkoti, DrPH, MPH – New Jersey Department of Health

Mwedusasa Mtenga, MPH – Florida Department of Health



Council of State and Territorial Epidemiologists



Shahnaj Binte Safi, MBBS, MPH
CSTE/NMDOH



Substance Use Related Emergency Department Visits Among Recently-released Prisoners In New Mexico: May 2019- April 2021

**November 16th, 2021
2021 Annual Syndromic Surveillance Symposium**

Shahnaj B. Safi, MBBS, MPH

CSTE Applied Epidemiology Fellow

New Mexico Department Of Health

Annaliese Mayette, PhD

Alcohol Epidemiologist

New Mexico Department of Health

Robert Kelly, PhD

Substance Abuse Epidemiology Section Manager

New Mexico Department of Health



Acknowledgements

- This study/ report was supported in part by an appointment to the Applied Epidemiology Fellowship Program administered by the Council of State and Territorial Epidemiologists (CSTE) and funded by the Centers for Disease Control and Prevention (CDC) Cooperative Agreement Number 1NU380T000297-03-00
- New Mexico Department of Health, Substance Use and Epidemiology Section
- New Mexico Corrections Department

Background

- Opioid Use Disorder (OUD) is a major public health concern. From 1999-2019, opioids (including prescription and illicit) have killed nearly 500,000 people in the United States. ^[1]
- The opioid epidemic affects incarcerated populations. Among all the incarcerated individuals, 65% meet the criteria for an OUD. ^[2]
- Incarcerated populations are vulnerable to substance use upon release because of many underlying factors, including, chronic pain, infection, trauma, mental health issues, disrupted social connection, stigma, poverty, interruption to opioid-related treatment and care, and PTSD. ^[3]
- Despite this high risk, few correctional systems screen for OUD among incarcerated persons, and the number that provide MAT are even fewer. ^[4]

Evidence-based Treatment for OUD

- **MAT (Medication-Assisted Treatment):** ^[5]
 - Medications
 - Buprenorphine, Methadone, Naltrexone to treat OUD and
 - Naloxone to prevent overdose
 - Counseling and behavioral therapies

In New Mexico...

- Naloxone “upon release” policy was implemented in the New Mexico Corrections Department (NMCD).
 - Since late 2017 for inmates with OUD history (House Bill 370 in 2017) ^[6]
 - Since early 2019 for all inmates
- Currently MAT is not provided at NMCD facilities.
- Buprenorphine is available at all NMCD facilities for pregnant women with substance use disorder. However, after delivery, only forced withdrawal is used.

Purpose of this Study

Identify possible underlying factors related to substance use among the recently released prisoners.

Compare substance use related ED visits before COVID-19 pandemic to substance use related ED visits during COVID-19 pandemic.

Sources

NMCD (New Mexico Corrections Department) Data:

- From May 2019 to March 2021
- Facilities included: All the state prison facilities; county and federal facilities were not included here.
- This includes Offender number, gender, address, race, incarceration date, release date, release type
- Was shared by FileZilla server from NMCD and we downloaded the data.

Syndromic Surveillance Data:

- From May 2019 to April 2021
- Facilities included: All emergency departments in New Mexico
- This includes emergency department visit data, diagnoses (ICD-10 Codes).
- First four diagnoses were coded to identify substance use related visits.

Data Matching

- NMCD data and SS data were matched using Link King.
- Matching variables:
 - First & Last name
 - SSN
 - DOB
- Matched results were reviewed & grouping was done using DOB and last name.



By royal decree The Link King banishes to the nether-regions

-> Duplicate records within administrative databases.

-> Uncertainty in the merging of administrative datasets

Royal Court

Behold the Majesty !

☹ Fear Not !

Release V9.0

MAXIMIZE this window for full display of text/controls

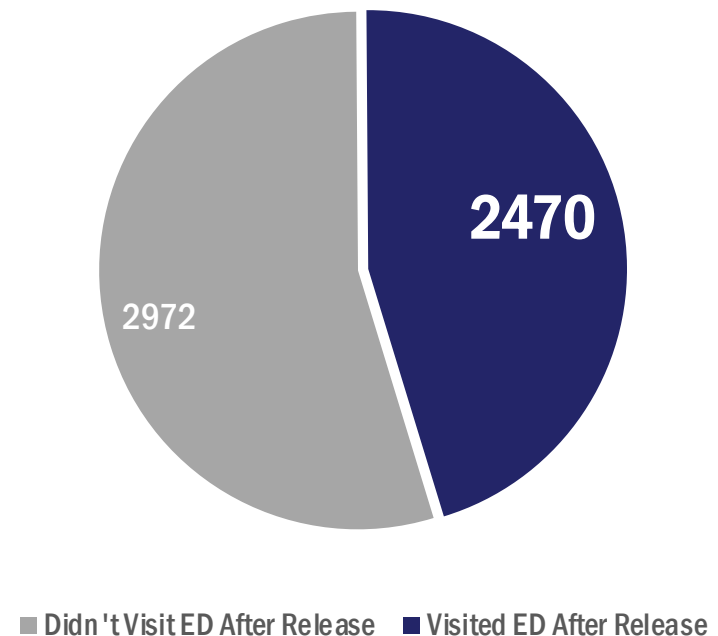
Methods

- Chi-square test: To compare between groups
- Microsoft Excel: Graphical representation
- SAS 9.4 used for all statistical analyses
- Link King: to link the NMCD and SS data

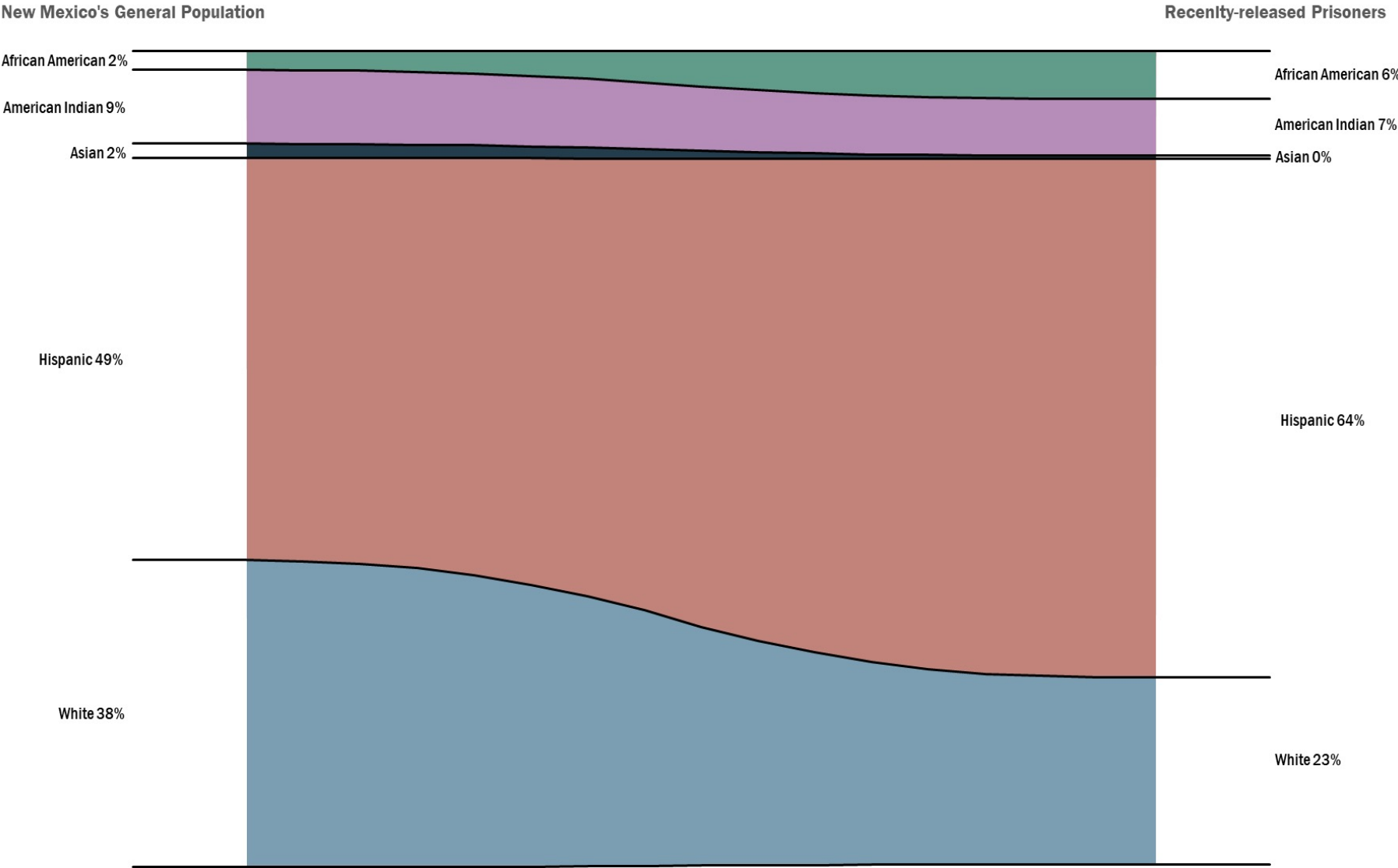
Study Population

- Total number of released prisoners is 5,442
- NMCD and Syndromic Surveillance linked data have 2,470 prisoners' information.
- **The study population is 2,470 recently-released prisoners who visited an ED after being released.**
- All the interpretation and findings were based on that study population specifically.
- Average length of incarceration: 3.3 years (S.D. 3.3)
- Mean age: 32.9 (S.D. 11.2)
- Average number of ED visits after release: 3.2 (S.D. 4.2)

Study Population is 2,470 recently released prisoners who visited ED after release



Representation of Hispanic and African-American population in New Mexico’s Prison System



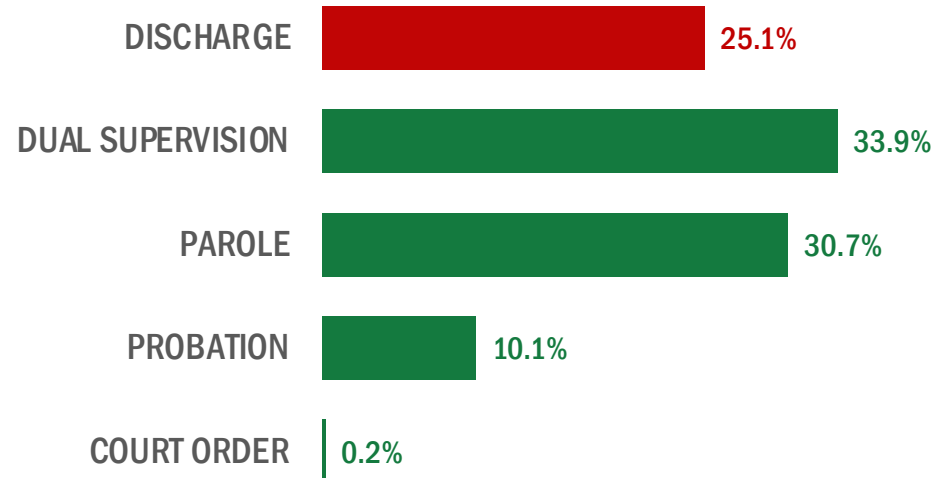
Release Type

Types of Release:

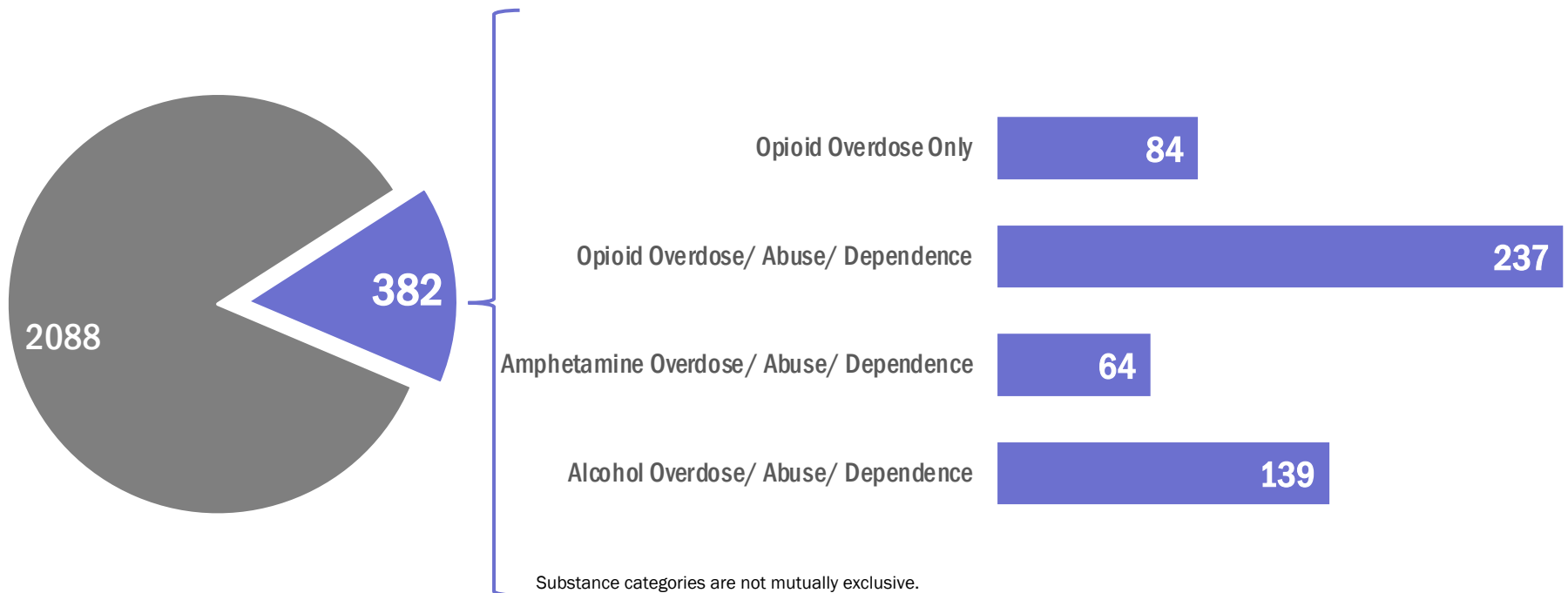
1) Discharge

2) Other:

- Dual Supervision
- Parole
- Probation
- Court order

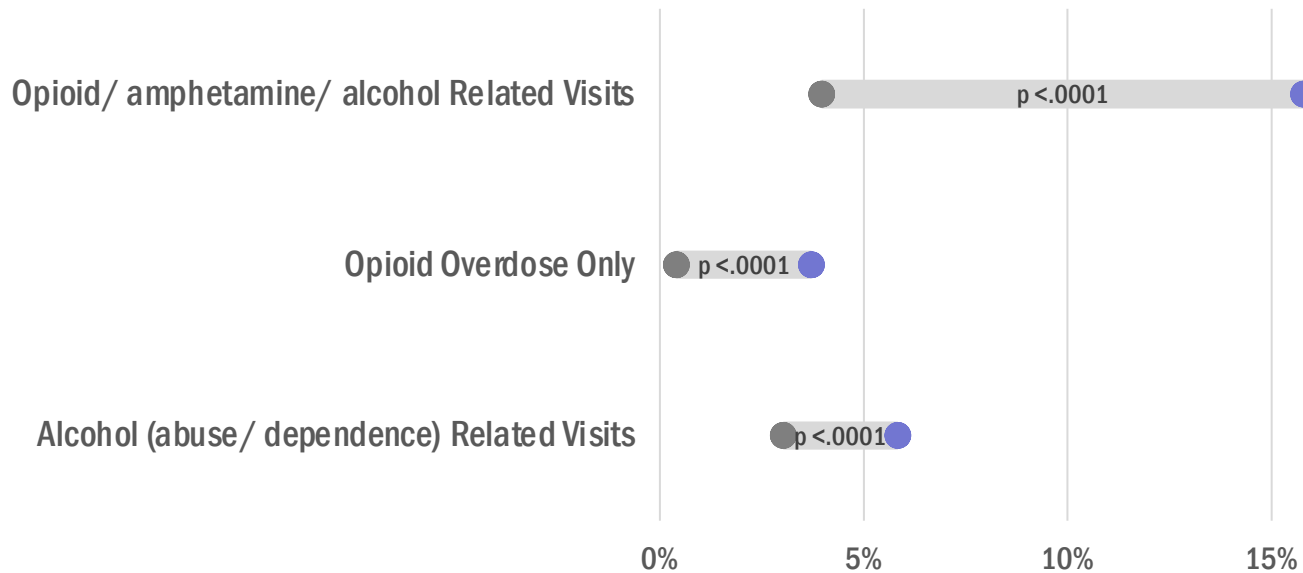


Post-Release Emergency Department Visits



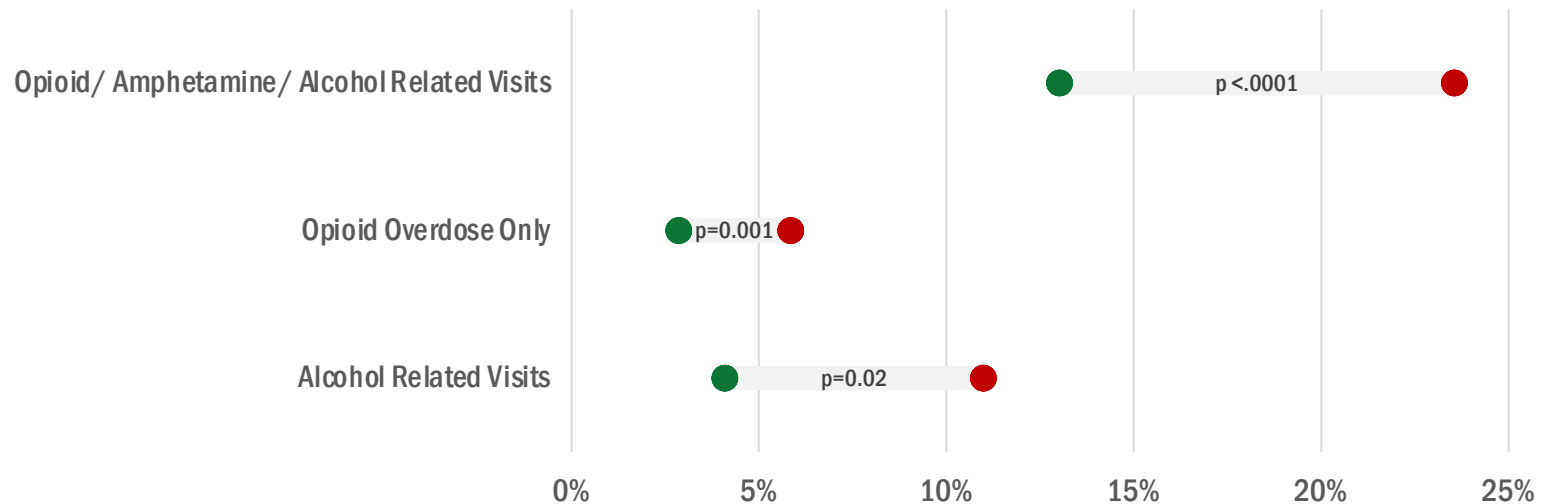
Substance Use-Related Emergency Department Visits

	General Population (18+ year old)	Recently- released Prisoners	p-value
Opioid/ Amphetamine/ Alcohol Related Visits	3.8%	15.6%	<.0001
Opioid Overdose Only	0.2%	3.5%	<.0001
Alcohol (abuse/ dependence) Related Visits	2.8%	5.6%	<.0001



Substance Use-Related Emergency Department Visits among the Recently-released Prisoners (**Discharge** vs. **Others**)

	Discharge (n=621)	Others (n=1,849)	p-value
Opioid/ Amphetamine/ Alcohol Related Visits	23.4%	12.8%	<.0001
Opioid Overdose Only	5.6%	2.7%	0.001
Alcohol (abuse/ dependence) Related Visits	10.8%	3.9%	<.0001



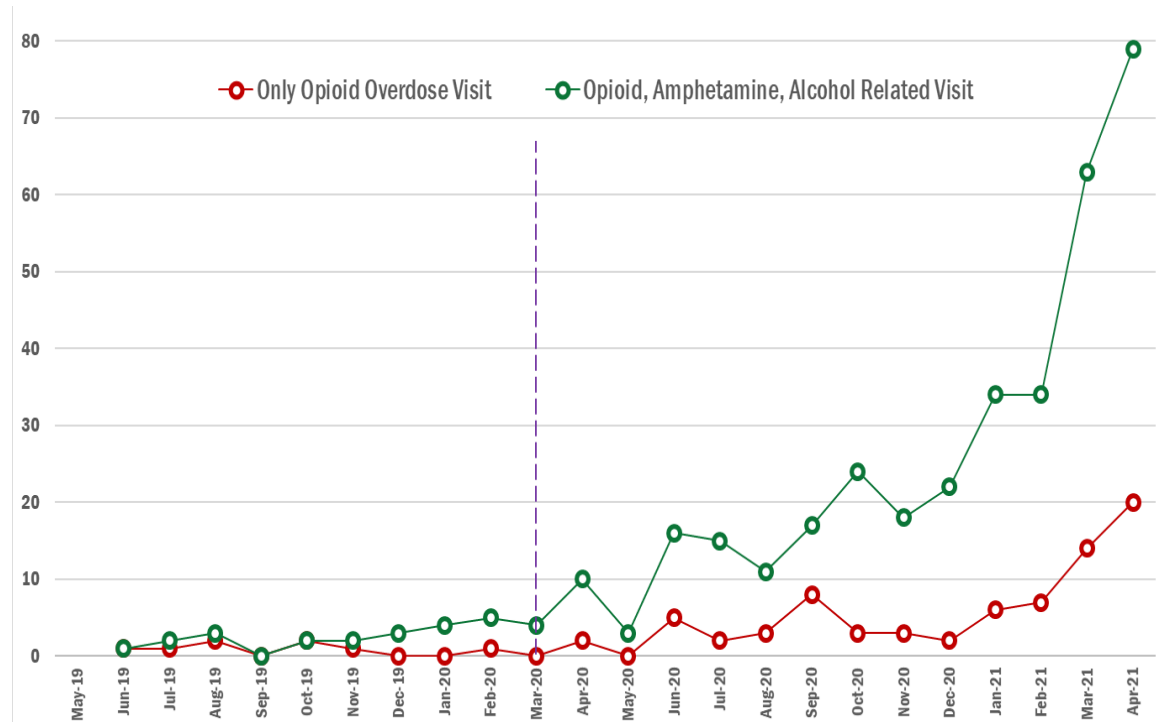
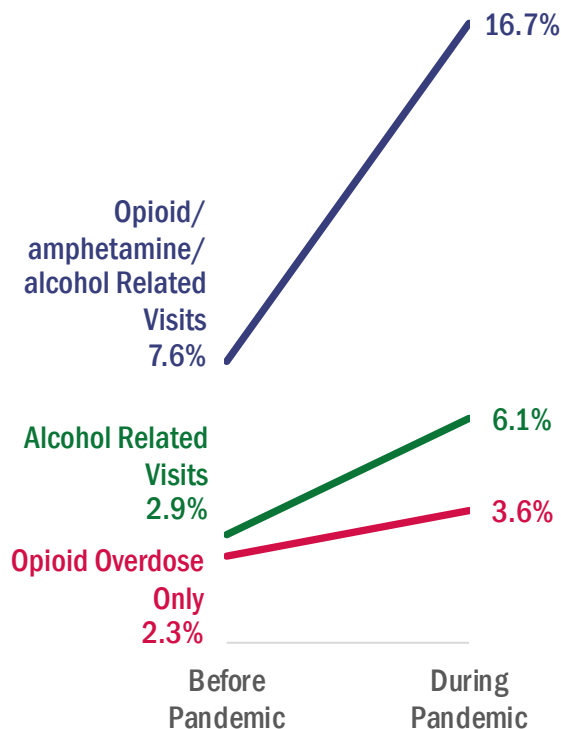
COVID-19 Pandemic and Substance Use Among the Recently Released Prisoners

Timeframes of pre-pandemic & during pandemic

- New Mexico announced shelter-in-place effective March 24th, 2020. This was used as a starting point to determine the pandemic effect.
- Pre-pandemic: All emergency department visits before March 24th, 2020
- During pandemic: All emergency department visits starting March 24th, 2020

ED visit Before vs. During COVID-19 Pandemic

	Before Pandemic (n=342)	During Pandemic (n=2128)	P-value
Opioid/ amphetamine/ alcohol Related Visits	26 (7.60%)	356 (16.73%)	<.0001
Opioid Overdose Only Visits	8 (2.34%)	76 (3.57%)	0.24
Alcohol (abuse/ dependence) Related Visits	10 (2.92%)	129 (6.06%)	0.02



Discussion

This study shows that recently-released prisoners have significantly higher rates of substance use related ED visits than the general population.

Individuals who were fully discharged had higher rates of substance use than those under supervision. This implies how social connection plays a vital role when returning to society.

Substance use related ED visits rates among released prisoners increased during the pandemic.

Recommendations...

1. Before Incarceration:

Screen incarcerated individuals for substance use during their admission.

2. During Incarceration:

- Provide available evidence-based treatment during and after incarceration.

3. During release/ After Incarceration:

- Help recently released persons connect with treatment and support groups and peer support workers prior to release from prison.
- Provide Naloxone for emergency use.
- Assist persons recently released from prison in a smooth transition back into society with housing, job opportunities and other mental health supports.

Future Directions...

Analyze this data in this study over longer time periods with different time intervals (2 weeks, 1 month, 3 months, 6 months) after release, to identify the most vulnerable time period.

Look for possible underlying factors and suggest appropriate policy change and recommendations.

Collect data on adverse childhood experiences (ACEs), mental health issues, socio-economic status, reasons for incarceration and other confounding factors to better understand the relation between incarceration and substance use after release.



Contact Info:

Shahnaj Binte Safi, MBBS, MPH
CSTE Applied Epidemiology Fellow
Email: Shahnaj.Safi@state.nm.us

Substance Use Epidemiology Section
Injury and Behavioral Epidemiology Bureau
Epidemiology and Response Division
New Mexico Department of Health

References:

1. Understanding the epidemic. (2021, March 17). Retrieved April 12, 2021, from <https://www.cdc.gov/drugoverdose/epidemic/index.html>
2. Treating Opioid Addiction in Criminal Justice Settings. Retrieved April 12, 2021, from <https://www.drugabuse.gov/publications/treating-opioid-addiction-in-criminal-justice-settings>
3. Joudrey, P., Khan, M., Wang, E., Scheidell, J., Edelman, E., McInnes, D., & Fox, A. (2019, April 15). A conceptual model for understanding post-release opioid-related overdose risk. Retrieved April 12, 2021, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6463640/>
4. Brinkley-Rubinstein, L., Zaller, N., Martino, S., Cloud, D., McCauley, E., Heise, A., & Seal, D. (2018, February 24). Criminal justice continuum for opioid users at risk of overdose. Retrieved April 14, 2021, from <https://www.sciencedirect.com/science/article/abs/pii/S0306460318300893?via%3Dihub>
5. Medication-Assisted Treatment (MAT). SAMHSA. (n.d.). <https://www.samhsa.gov/medication-assisted-treatment>.
6. Katzman, J. A., Bhatt, S., Duensing, K., Martinez, D., & Swift, R. (2017, December 18). New Mexico Naloxone Legislation: Targeting those Most in Need. Journal of Drug Abuse. <https://drugabuse.imedpub.com/new-mexico-naloxone-legislation-targeting-those-most-in-need.php?aid=21401>.



Scott M. Johnston, MPH
Kansas Department of Health
and Environment



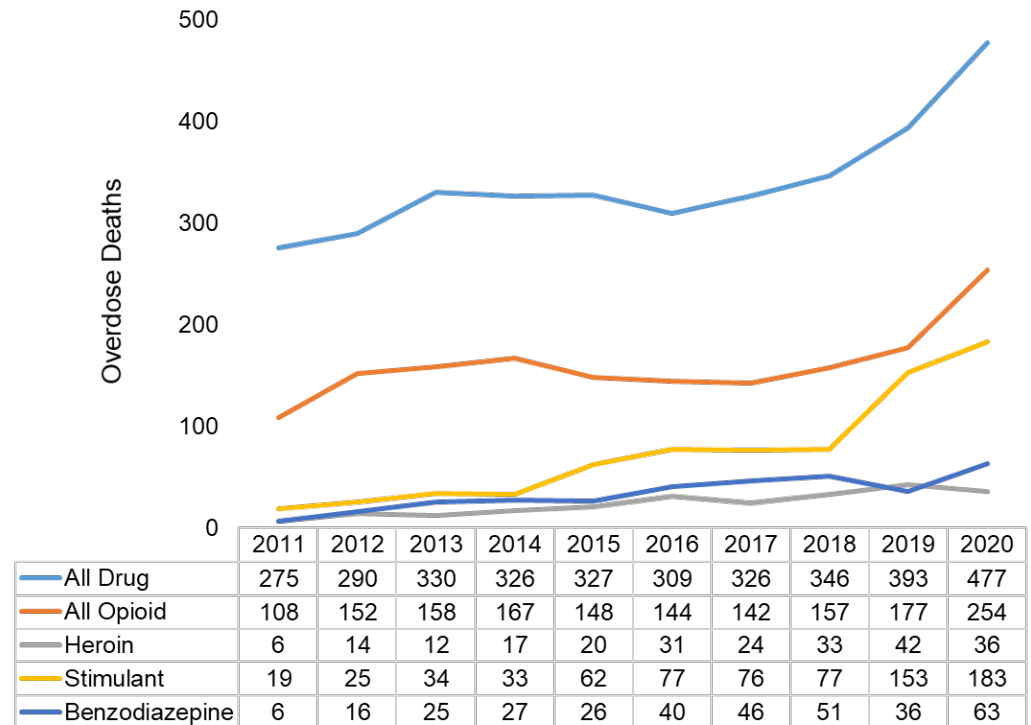


Monthly Cluster Analysis of Emergency Department Drug Overdoses in Kansas Utilizing ESSENCE Data

Overdose Crisis

- Overdose mortality and morbidity has worsened in recent years
- In response, the Kansas Department of Health and Environment is seeking to develop innovative overdose surveillance projects through Strategy 3 of the Overdose Data to Action CDC cooperative agreement

Figure 1. Kansas Overdose Mortality 2011-2020

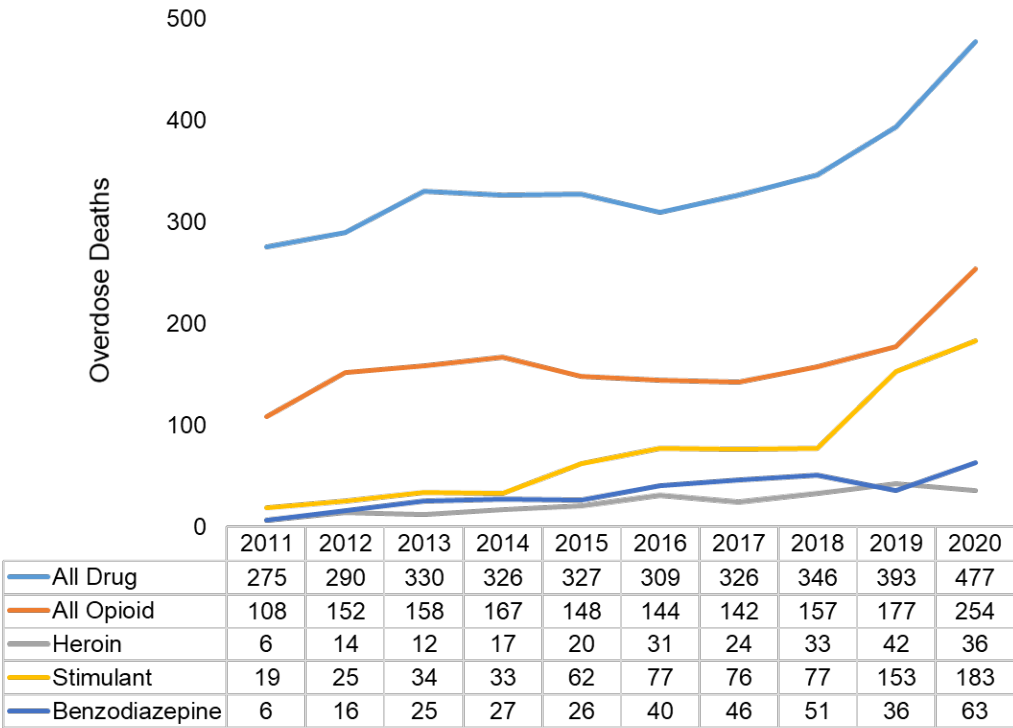


Data Source: Mortality Database – Kansas Office of Vital Statistics

Objective

- To develop an analysis method that rapidly detects emerging overdose clusters at a level more geographically precise than the county level

Figure 1. Kansas Overdose Mortality 2011-2020



Data Source: Mortality Database – Kansas Office of Vital Statistics

Data Source

- Electronic Surveillance System for the Early Detection of Community based Epidemics (ESSENCE)
 - Currently capturing approximately 97 percent of Emergency Department Visits (EDVs) in Kansas
- Data preparation and analysis software: SAS v9.4 and SaTScan v9.6, Visualization Software: Tableau

Case Definitions

- ESSENCE Queries using CDC defined CC and DD Categories
 - CDC All Drug v2
 - CDC Opioid Overdose v3
 - CDC Heroin Overdose v4
 - CDC Stimulants v3
 - CDC Benzodiazepine v1
- Has Been Emergency = Yes
- Includes fatal and non-fatal
- All Kansas Counties
- Queries included entire year of cases; full 12 months prior to the last day of the month of interest

Population

- Based on patient residence zip code converted to Zip Code Tabulation Area (ZCTA)
- Census provides population data by ZCTA using American Community Survey 5-Year Estimate

Analysis

- Cases aggregated into each month from Sept. 2020 through July 2021, across all 5 drug categories
- Clusters require a minimum of 2 cases in a circle across one or more ZCTAs with a maximum radius of 15.5 miles (25 km)
- SaTScan identifies many potential clusters by comparing the observed number of overdose EDVs inside the circle to what would be expected
- P-value generated to determine statistical significance

Input

- Case file: ZCTA/Location, Count of overdose EDV, Date
- Pop file: ZCTA/Location, population
- Geo file: ZCTA/Location, coordinates

Output

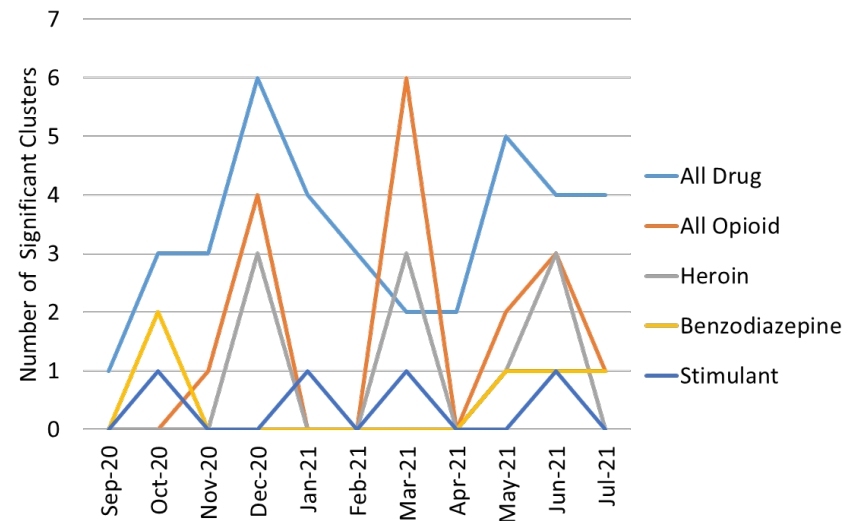
- Text and DBF files with cluster information including:
 - Observed overdose EDV count
 - Expected count
 - Relative Risk
 - ZCTAs included
 - Population within cluster
 - Coordinates and radius
 - P-value
- Excel sheets with ZCTA information
- Shapefile, Google Earth KML file, and HTML of clusters

Table 1. Overdose Clusters Identified During Monthly Analysis Sept. 2020 – July 2021

Drug Category	Total Number of Clusters Identified	Number of Significant Clusters (%)
All Drug	163	37 (22.7)
All Opioid	136	17 (12.5)
Heroin	72	10 (13.9)
Benzodiazepine	98	5 (5.1)
Stimulant	102	4 (3.9)
Total	571	73 (12.8)

Data Source: ESSENCE 2021

Figure 2. Number of Significant Overdose EDV Clusters by Month and Drug Type Sept. 2020 - July 2021



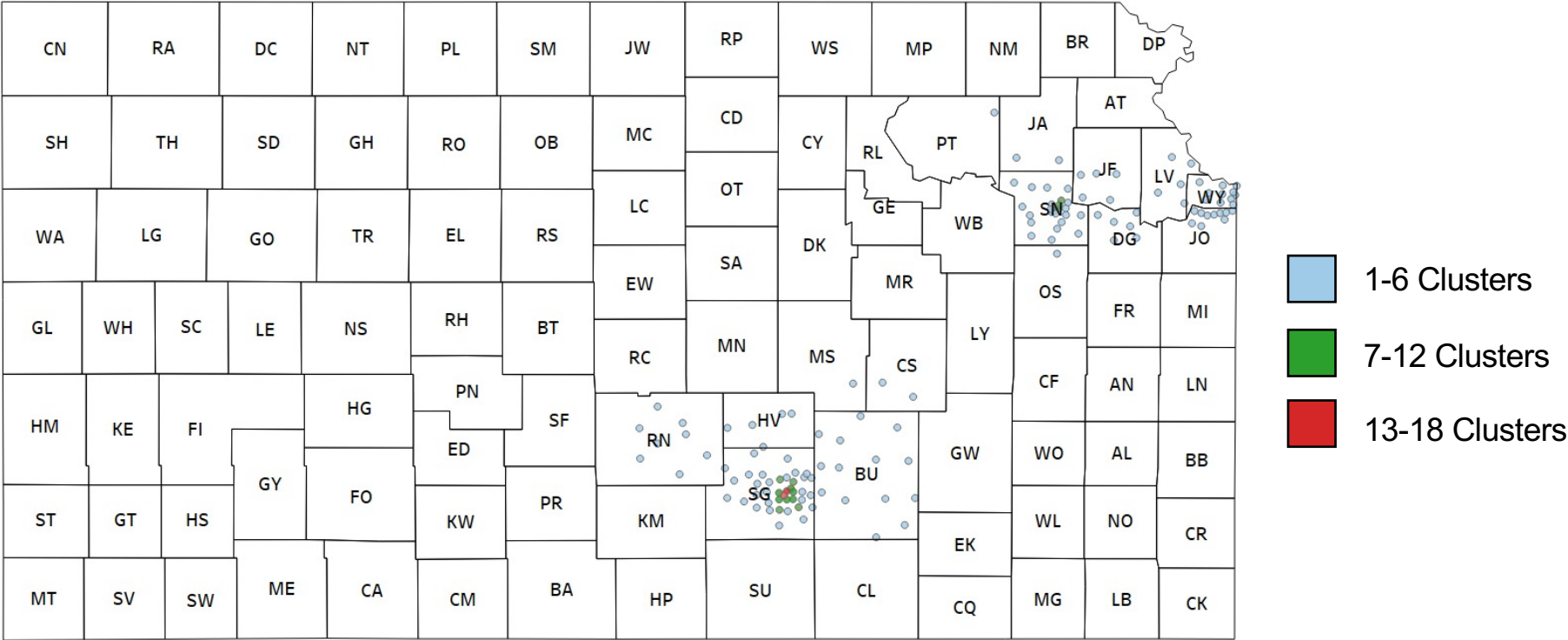
Data Source: ESSENCE 2021

Table 2. All Drug Primary and Significant Secondary Overdose ED Clusters: Sept. 2020 – July 2021

Cluster Month and ID	Observed OD	Expected OD	Relative Risk	Cluster Population	P-Value	Center ZCTA	Number of ZCTAs in Cluster
Sept 2020							
A	9	0.4	25.8	1,751	<.01	67202	1
Oct 2020							
A	27	5.0	5.4	24,095	<.01	67213	2
B	17	3.5	4.6	16,700	<.01	67214	3
C	34	15.2	2.2	73,303	0.03	66607	10
Nov 2020							
A	113	59.9	1.9	298,153	<.01	67217	17
B	79	45.2	1.8	225,155	<.01	67204	14
C	11	1.9	5.9	9,367	<.01	66603	3
...	...	...	...	...	...	...	...

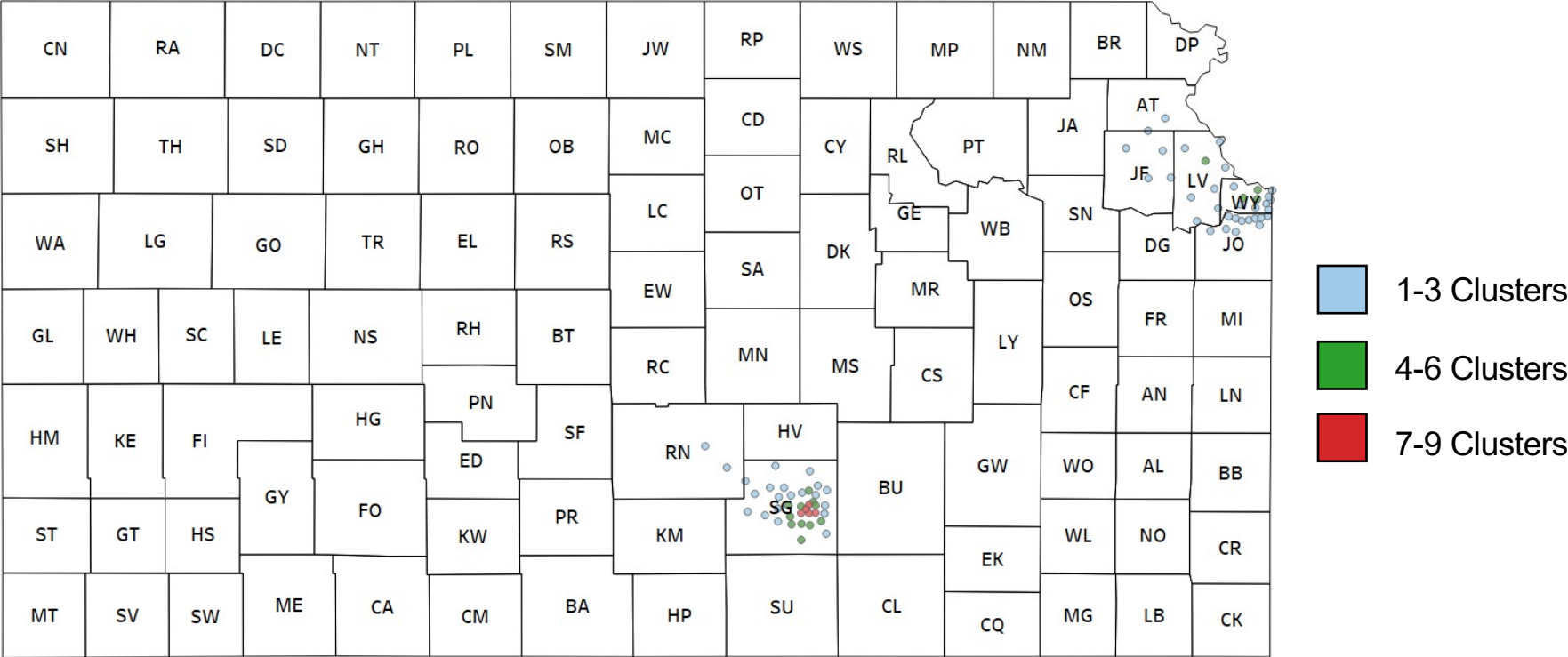
Data Source: ESSENCE 2021

Figure 3: Map of ZCTAs Included in Significant All Drug EDV Clusters by Frequency Sept. 2020 - July 2021



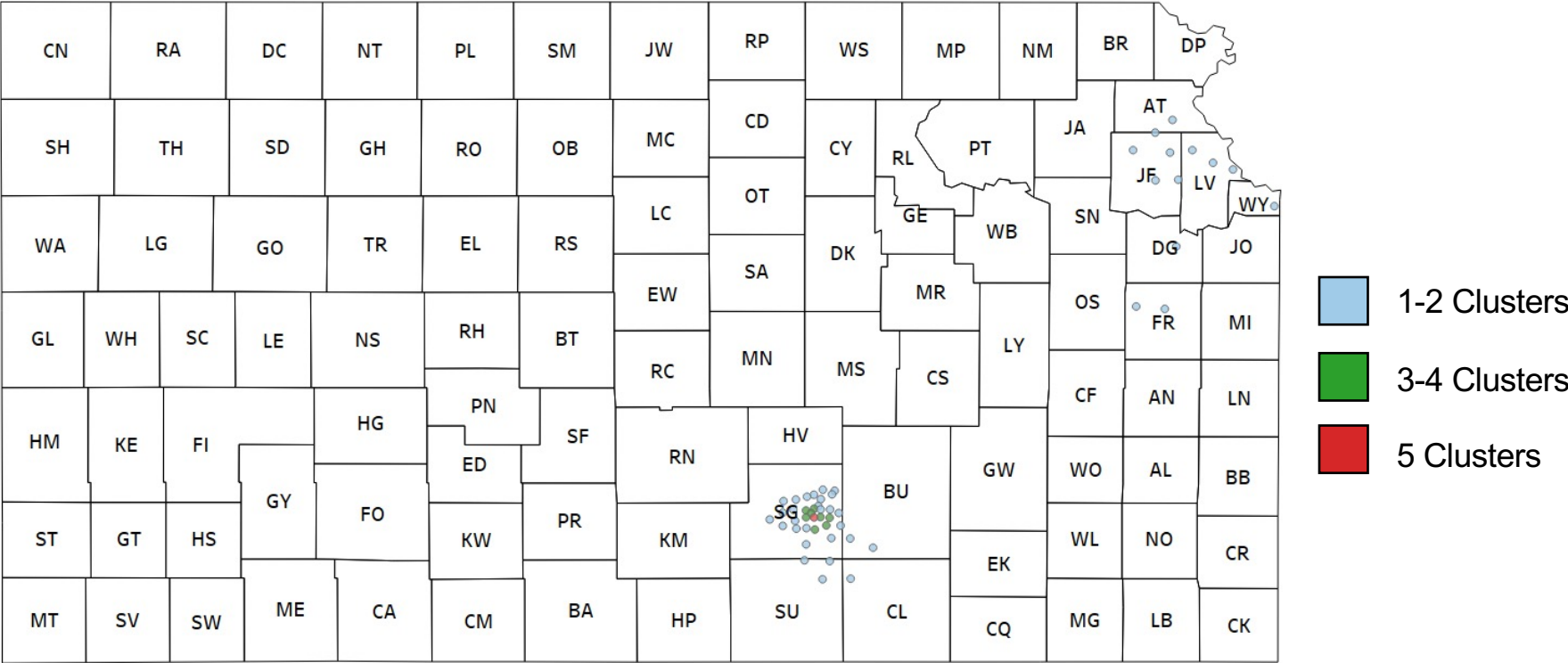
Data Source: ESSENCE 2021

Figure 4: Map of ZCTAs Included in Significant All Opioid EDV Clusters by Frequency Sept. 2020 - July 2021



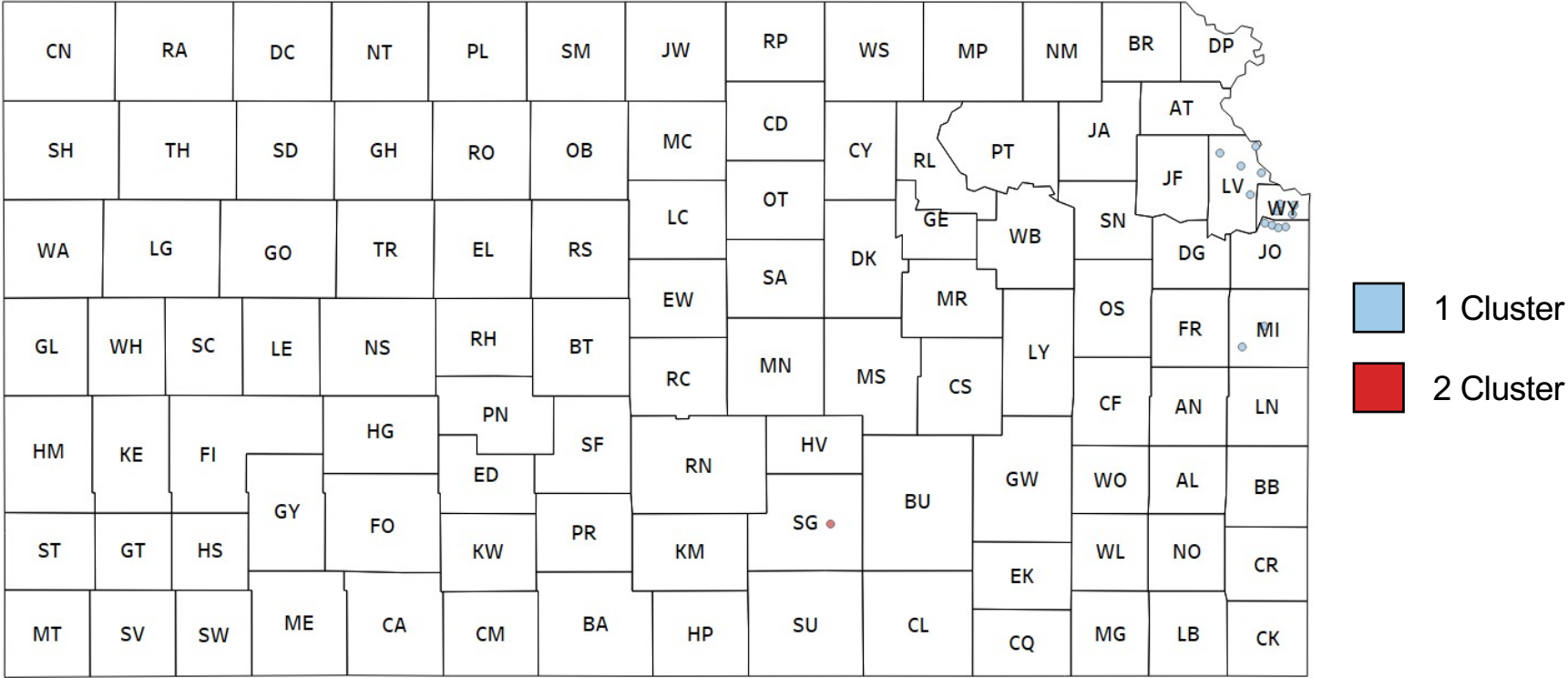
Data Source: ESSENCE 2021

Figure 5: Map of ZCTAs Included in Significant Heroin EDV Clusters by Frequency Sept. 2020 - July 2021



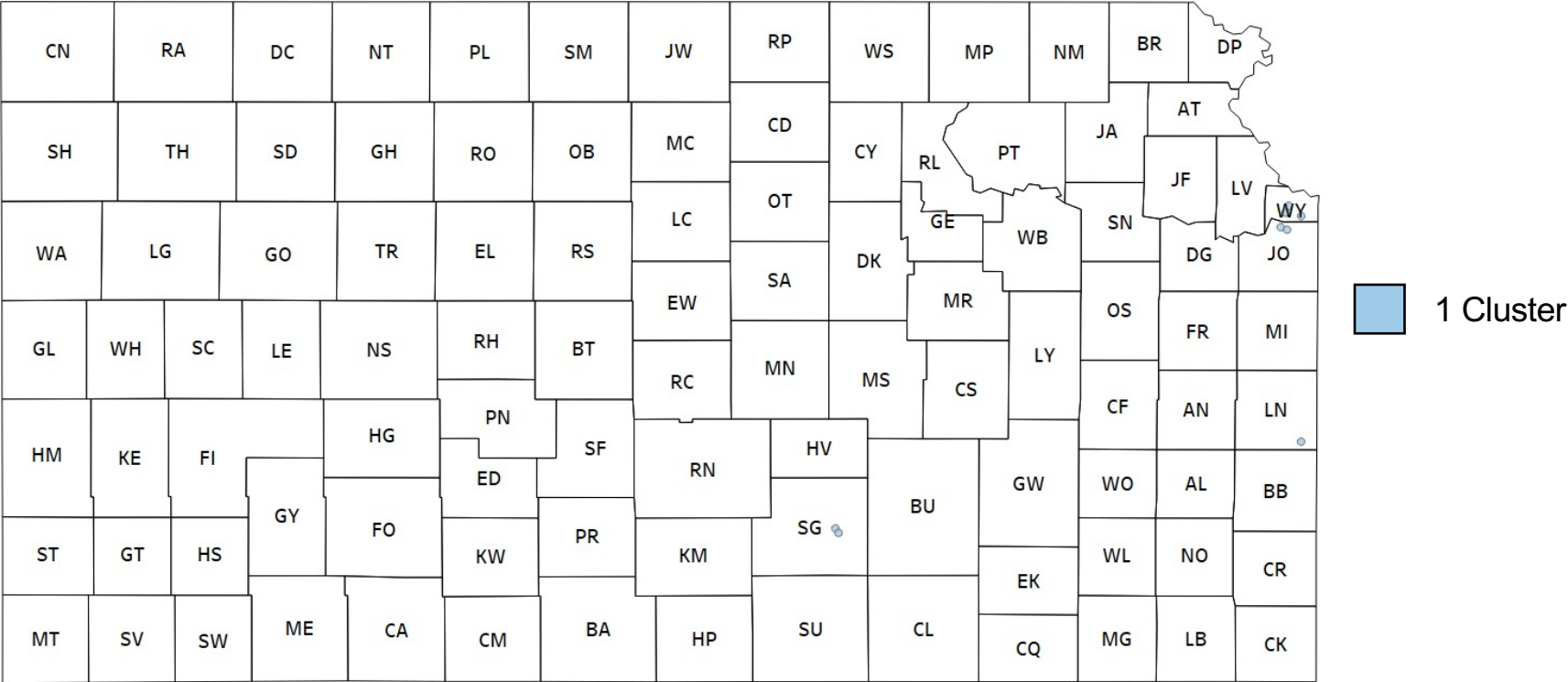
Data Source: ESSENCE 2021

Figure 6: Map of ZCTAs Included in Significant Benzodiazepine EDV Clusters by Freq. Sept. 2020 - July 2021



Data Source: ESSENCE 2021

Figure 7: Map of ZCTAs Included in Significant Stimulant EDV Clusters by Frequency Sept. 2020 - July 2021



Data Source: ESSENCE 2021

Strengths

- ESSENCE system provides near real-time data with most cases submitted within 72 hours
- Cluster analysis using patient residence zip code in SaTScan allows for clusters to be identified at a neighborhood level compared to strictly county level – provides unique opportunity for informing local prevention efforts

Limitations

- Variation in consistent reporting from week to week and differences in how data is recorded between facilities contribute to data quality limitations
- Potential for small number of false positives due to the ESSENCE query system (history of a patient having an overdose may be returned in the query as an overdose related EDV)
- Patient residence zip code is used rather than location of actual overdose event
- Only utilizes emergency department visits

Further Action

- Currently repeating this analysis on a monthly basis
- Each month, based on county-wide overdose alert values as well as any identified clusters, Local Health Departments are informed via alert emails

1. CDC. "Drug Overdose Deaths." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 3 Mar. 2021, www.cdc.gov/drugoverdose/deaths/index.html
2. KDHE. "Mortality Data." Kansas Department of Health and Environment: Prescription Drug Overdose/Misuse Prevention, www.preventoverdoseks.org/mortality_data.htm.
3. Kulldorff M. Prospective time-periodic geographical disease surveillance using a scan statistic. *Journal of the Royal Statistical Society*, 2001; A164:61-72. <https://www.satscan.org/papers/k-jrssa2001.pdf>
4. Kulldorff M. A spatial scan statistic. *Communications in Statistics: Theory and Methods*, 1997; 26:1481-1496. <https://www.satscan.org/papers/k-cstm1997.pdf>
5. Chen, Jianhua et al. "Using Scan Statistic to Detect Heroine Overdose Clusters with Hospital Emergency Room Visit Data." *Online Journal of Public Health Informatics* vol. 10,1 e26. 30 May. 2018, doi:10.5210/ojphi.v10i1.8344 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6088037/>
6. KDHE "Kansas Syndromic Surveillance Program." *Kansas Department of Health & Environment*, www.kdheks.gov/phi/KSSP.htm.
7. NSSP "Knowledge Repository." knowledgerepository.syndromicsurveillance.org/search/syndrome.
8. UDS Mapper. "2019 ZIP to ZCTA Crosswalk" <https://udsmapper.org/zip-code-to-zcta-crosswalk/>
9. Census Bureau. "2019 ZCTA Gazetteer" <https://www.census.gov/geographies/reference-files/time-series/geo/gazetteer-files.2019.html>
10. Census Bureau "American Community Survey" 2019 5-Year Estimate <https://www.census.gov/programs-surveys/acs>

Scott Johnston, MPH

Epidemiologist, Kansas Overdose Data to Action
Bureau of Epidemiology and Public Health
Informatics

Scott.Johnston@ks.gov



Malathi Aarkoti, DrPH, MPH
New Jersey Department of Health



Setting the Bar: A New Jersey Overdose Anomaly Threshold Pilot Project

Sarah Malarkey, BS², Malathi Aarkoti, DrPH, MPH¹, Teresa Hamby, MSPH¹, and Stella Tsai, PhD, CIH¹

¹New Jersey Department of Health, Trenton, NJ, ²Rutgers University, Newark, NJ

Introduction

- New Jersey Department of Health (NJDOH) pilot project establishes thresholds for anomaly alerts for overdose visits to Emergency Departments (ED) including all drugs, all opioids, heroin, and stimulants, for counties in New Jersey (NJ).
 - If overdoses exceed the set threshold levels, Epicenter will send an automatically generated email alert to respective County Health officials.
- Purpose**
- LHDs can use this information to prepare their overdose spike response teams or local partner organizations.

Methods

Pilot three counties (Atlantic, Ocean, and Camden) to establish thresholds for anomaly alerts.

EpiCenter used to generate charts and threshold levels for the State and the counties.
Used ED visits data from 2019 and 2020.

Average daily overdose counts were calculated by taking the average daily number of overdoses to establish appropriate constant threshold levels.

When visit volume exceeds these constant threshold levels, county health officials will receive an email alert from EpiCenter notifying them that there is an overdose spike.

Results

Table 1: 2019 & 2020 Average Daily Overdoses Counts per 100,000 for all Classifications

Counties	2019				2020			
	All Drug	Opioid	Heroin	Stimulant	All Drug	Opioid	Heroin	Stimulant
Atlantic	0.8	0	0	0	0.8	0	0	0
Camden	1.6	0.6	0.20	0	1.4	0.4	0	0
Ocean	0.8	0.3	0.2	0	0.7	0.3	0	0

- No increases in average daily overdose counts in each county from 2019-2020.
- Decrease in average daily overdose for Camden County for all classifications except stimulants.
- Decrease in average daily overdose for Ocean County for all-drugs and heroin classification.
- Atlantic County had a 52% and 46% increase in February and March, respectively, for all-drugs classifications.
- For opioid overdoses, Ocean County had a 94% and 45% increase in months of February and March, respectively compared to Atlantic and Camden County that had an overall decrease.

Figure 1: July 2020 Threshold levels of Suspected Drug Overdoses in Ocean County

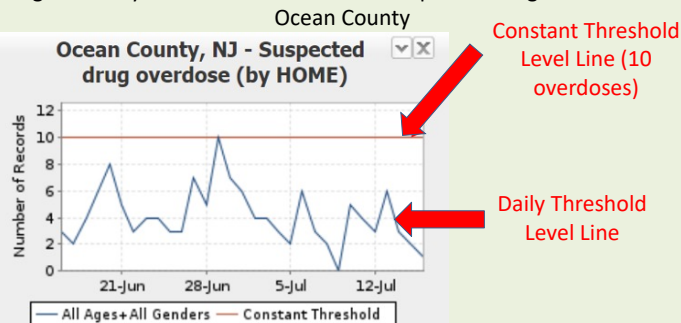
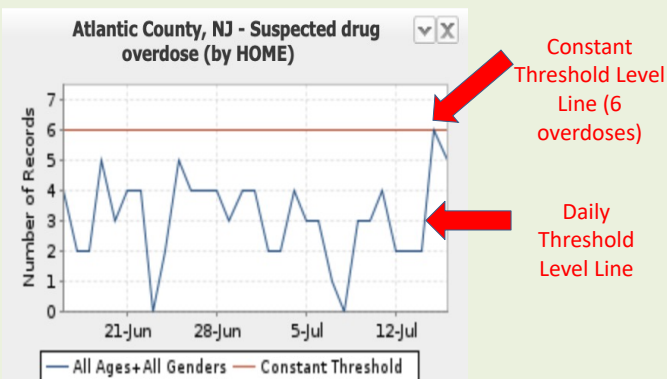


Figure 2: July 2020 Threshold levels of Suspected Drug Overdoses in Atlantic County



Discussion and Future Steps

Continue outreach with pilot counties and receive feedback, customize threshold levels, and select health officials to receive email alerts.

After successful implementation with pilot counties, we plan to coordinate with remaining 18 counties in New Jersey.

Encourage LHDs to coordinate with community partners to develop community action plans and resources to distribute for an overdose spike response.



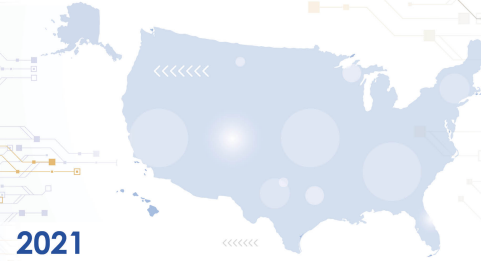
Mwedusasa Mtenga, MPH
Florida Department of Health



National Syndromic Surveillance Program

Community of Practice

Resources that Advance the Science and
Practice of Syndromic Surveillance



2021

Syndromic Surveillance Symposium

Week of November 15, 2021



KAHUINA
CONSULTING