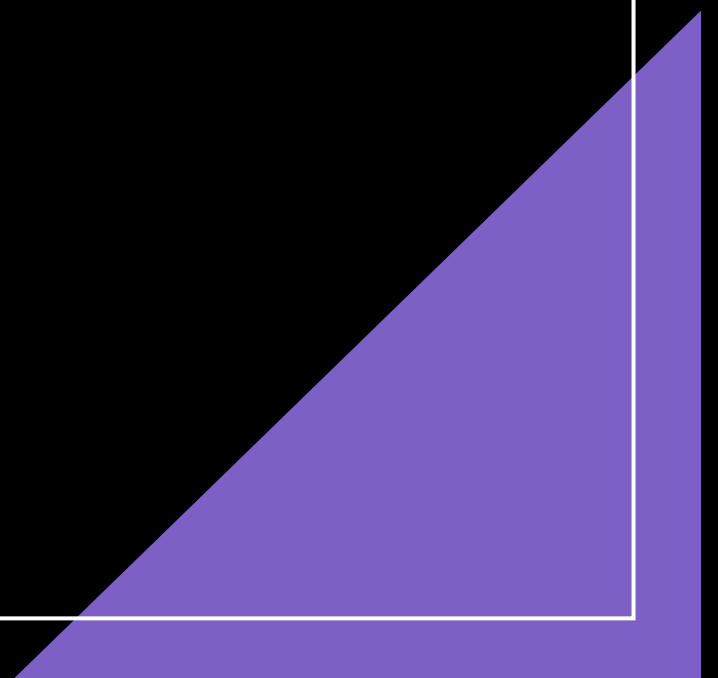


Drug Overdose Anomaly Detection in Michigan

Rita Seith, MPH

Hannah Matthews, MPH

December 12, 2022



Overview



What are we trying to detect?



How are we using EMS data?

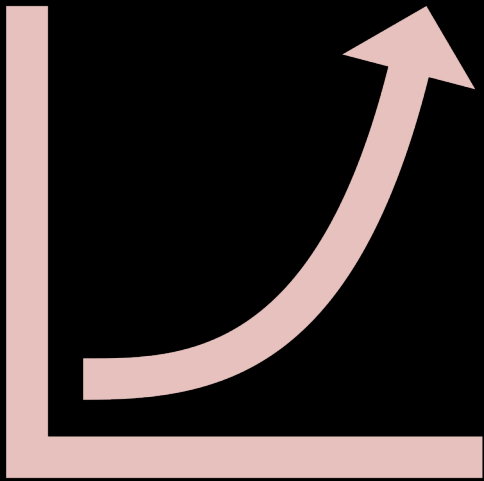


What are recent examples of anomalies?

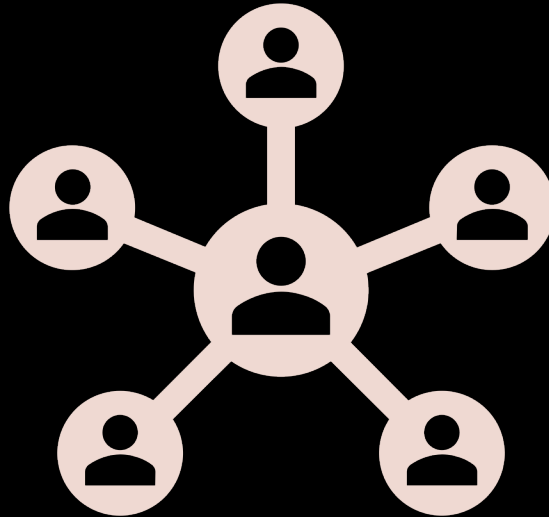


What are our next steps?

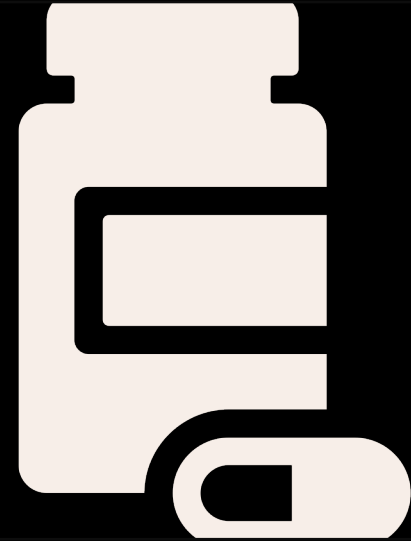
What are we trying to detect?



Spike



Cluster



Novel drug threat

Data Sources



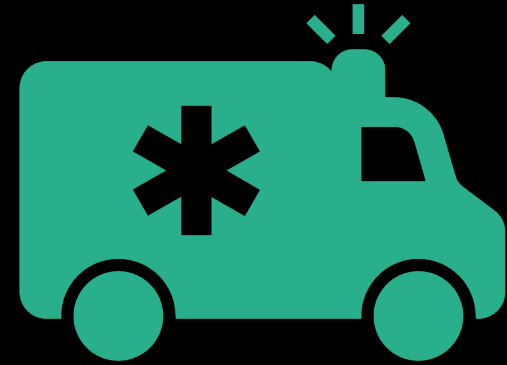
Fatal

Swift Toxicology of
Overdose-Related
Mortalities
(STORM)



Emergency Dept.

Michigan
Syndromic
Surveillance
System (MSSS)



EMS

biospatial

How are we using EMS data?

All EMS agencies report data to MiEMSIS (Michigan data repository)

biospatial is a national platform that ingests EMS data

Syndromes are applied to EMS responses in biospatial

How are anomalies detected in biospatial?



Custom Alert



Anomalous Alerts

Creates predicted distribution of EMS runs, for given syndrome

Compares to observed number of runs for given date

Flags abnormally high observed counts

Generates email

Pros / cons of biospatial alerts

Pros

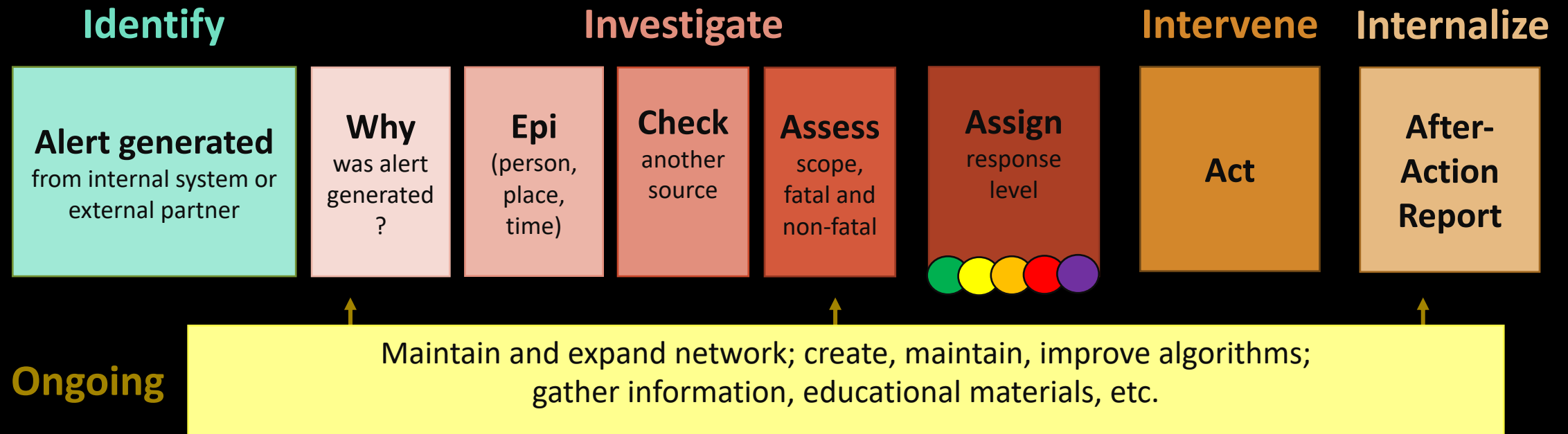
- Automated
- Mapping
- Line-level data
- Powerful query tools
- All Michigan counties
- Timely*

Cons

- Alerts at county level
- No deduplication
- Urban density issues
- Reliant on Mi-EMSIS data quality
- Reason for alert not always clear

*from October-November 2022, 83% of EMS responses in Michigan were in biospatial within 0-1 days after the incident occurred

Drug Overdose Anomaly Response Protocol (DARP)



How do we work with partners?

EMS

Michigan State Police

Drug Monitoring Initiative

Viral Hepatitis Unit

Prevention

Local Health Departments

Context

Toxicology

Clinical implications

Harm reduction

Local response

Case #1

Novel drug threat



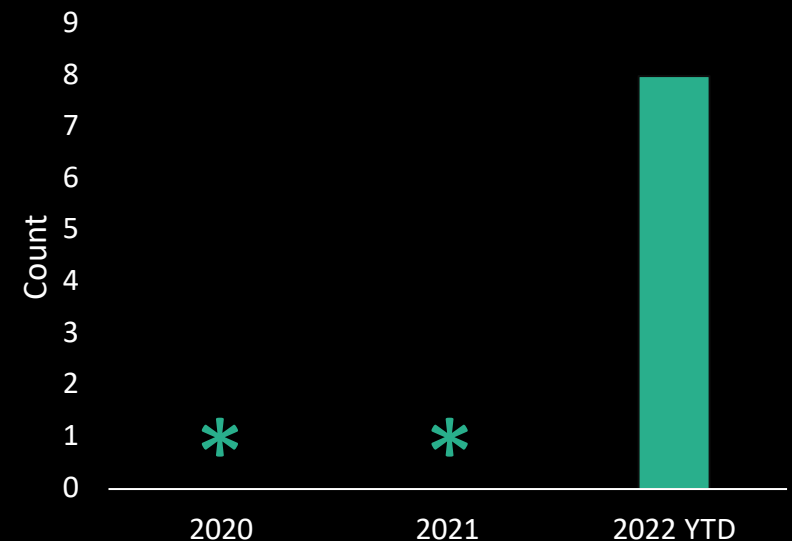
Case #1

STORM, rapid tox – new SAS code to detect anomalies in drug combinations

- September 2022
- Calhoun County
- **Increase of decedents testing positive for xylazine, fentanyl, and cocaine**

OED assigned a **yellow response**; emailed local partners; prepared Xylazine [factsheet](#).

Figure 1. STORM – Annual Count of Decedents Testing Positive for Xylazine, Fentanyl, and Cocaine, Calhoun County (1/1/20 – 9/18/22)



*between 1-5 deaths

Case #2

Clusters,
novel drug threat

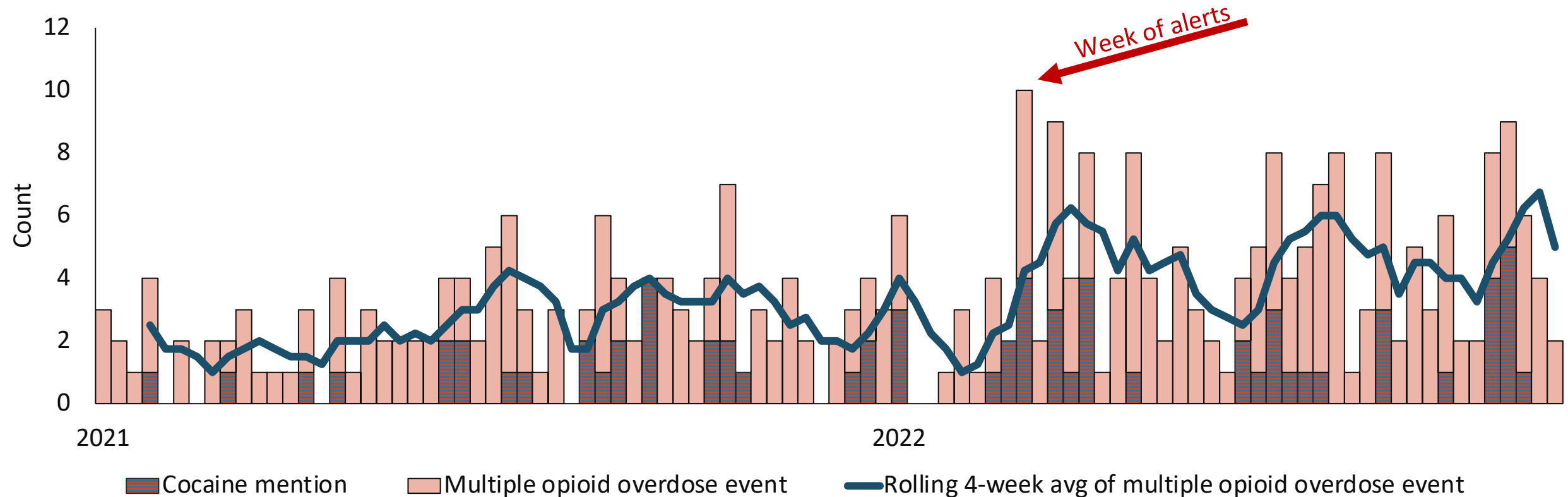


Case #2

- March 2022
- Several biospatial alerts sounded for counties in SE / SW Michigan
- Not spikes compared to historical data
- Several multiple opioid overdose events
 - **more than one person experiencing opioid overdose at same time (i.e., double, triple, quadruple overdoses)**
 - **patients took what they thought was cocaine** (Figure 2)

OED assigned a **yellow response**; emailed partners in affected counties; continued monitoring for similar cases.

Figure 2. Weekly Count of EMS Responses to Multiple Opioid Overdose Events in Michigan, those Mentioning Cocaine, and Rolling 4-Week Average of Multiple Opioid Overdose Events, from January 1, 2021 - October 23, 2022



Case #3

Cluster



Case #3

- June 2022
 - EMS partner notified of mass casualty event
 - **5 patients experienced opioid overdose at same time; one death**
-
- No biospatial alert sounded
 - 24-hour count at county level within expected range
 - **OED connected with Kent County – local DARP plan**

MICHIGAN

1 dead, 4 others stable after suspect overdose at W. Mich. motel



Charles E. Ramirez

The Detroit News

Published 12:35 p.m. ET June 21, 2022 | Updated 5:24 p.m. ET June 21, 2022



Other biospatial features

Biosurveillance dashboard

- Alerts over time
- Data completeness
- Comments

Symptoms

- Flags keyword / phrase patterns in record
- Ex. benzodiazepines, cocaine, fentanyl, etc.

Notify

- Generates email for specific events
- Ex. within past 7 days, any drug overdose syndrome +
mass casualty = **TRUE**

Evaluate

new EMS case definitions

Support

LHDs in using biospatial

Assess

geospatial / temporal clustering

Improve

EMS data quality

**Next
steps**

EMS data limitations

Duplicates

Records vary in detail, timeliness

Alerts can miss clusters

Case definitions = not perfect

...and strengths!

Timely

By incident location

Various outcomes (ED, AMA, deaths)

Narrative detail

Important tool for anomaly
detection!

Questions?

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Abbreviations

MODA Michigan Overdose Data to Action

OED Opioids & Emerging Drugs Unit

MiEMSIS Michigan EMS Information System

DARP Drug Overdose Anomaly Response Protocol

MSP Michigan State Police

SSP Syringe Service Program

LHD Local Health Department