MiCelerity: How local health can leverage Michigan's overdose surveillance system

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What is MiCelerity?

- Real-time drug poisoning surveillance system
- Fatal and non-fatal suspected overdoses
- Managed by the Michigan Overdose Data to Action (MODA) Surveillance Team within MDHHS
- Utilizes mandatory reporting of drug poisoning events
- Innovative data capture from Admission, Discharge, and Transfer (ADT) messages
    - Can be expanded to other injury events and chronic diseases

What data is captured in MiCelerity?

- Statewide
- Hospital emergency departments (primarily)
- Event-based system using diagnostic codes:
  - Drug poisonings (T36-T50);
  - Drug-related mental/behavioral disorders (F11-F16, F18-19);
  - Neonatal abstinence syndrome (P04);
  - Fetal alcohol syndrome (P96);
  - Events related to the toxic effect of alcohol (T51)
- Personally identifiable information for each event
  - Demographic and geographic information

How does MiCelerity differ from other surveillance systems?

- Individually identifying information for overdose events
  - Patient-level linkage across events
  - Longitudinal assessment
- Assists provider compliance with overdose reporting
- Collects death certificate data
  - Data on both fatal and non-fatal suspected overdoses

How can MiCelerity help my jurisdiction?

- Track trends
- Understand health disparities
- Target programmatic work
- Automated alerts

Local data to drive **local** decision-making

What can be done in MiCelerity?

- View and track trends
  - NEW! Dashboard with aggregated visualizations
- Export search output in pdf or csv
  - Search by desired criteria (time, diagnosis, geographic area)
  - Save search criteria for future use
- Set up alerts
  - Create rules for generating alerts
  - Can be for specific jurisdictions, facilities, diagnosis codes, drug classes
  - Can be based on raw count or statistical aberration
- Share data for multijurisdictional monitoring

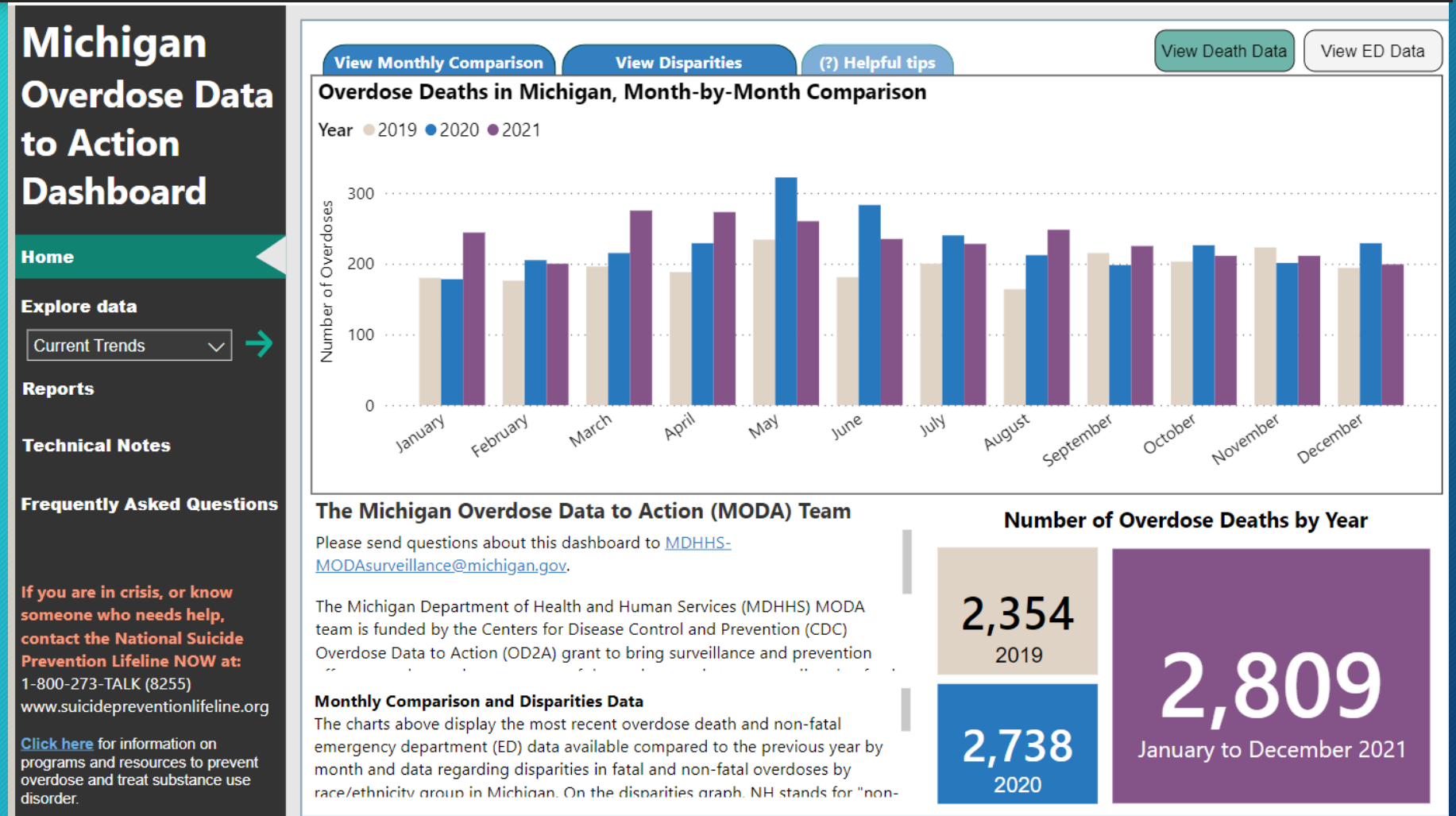
Who can access MiCelerity?

A. Local health department (LHD) personnel;
B. Healthcare providers from reporting facilities; or
C. MDHHS personnel

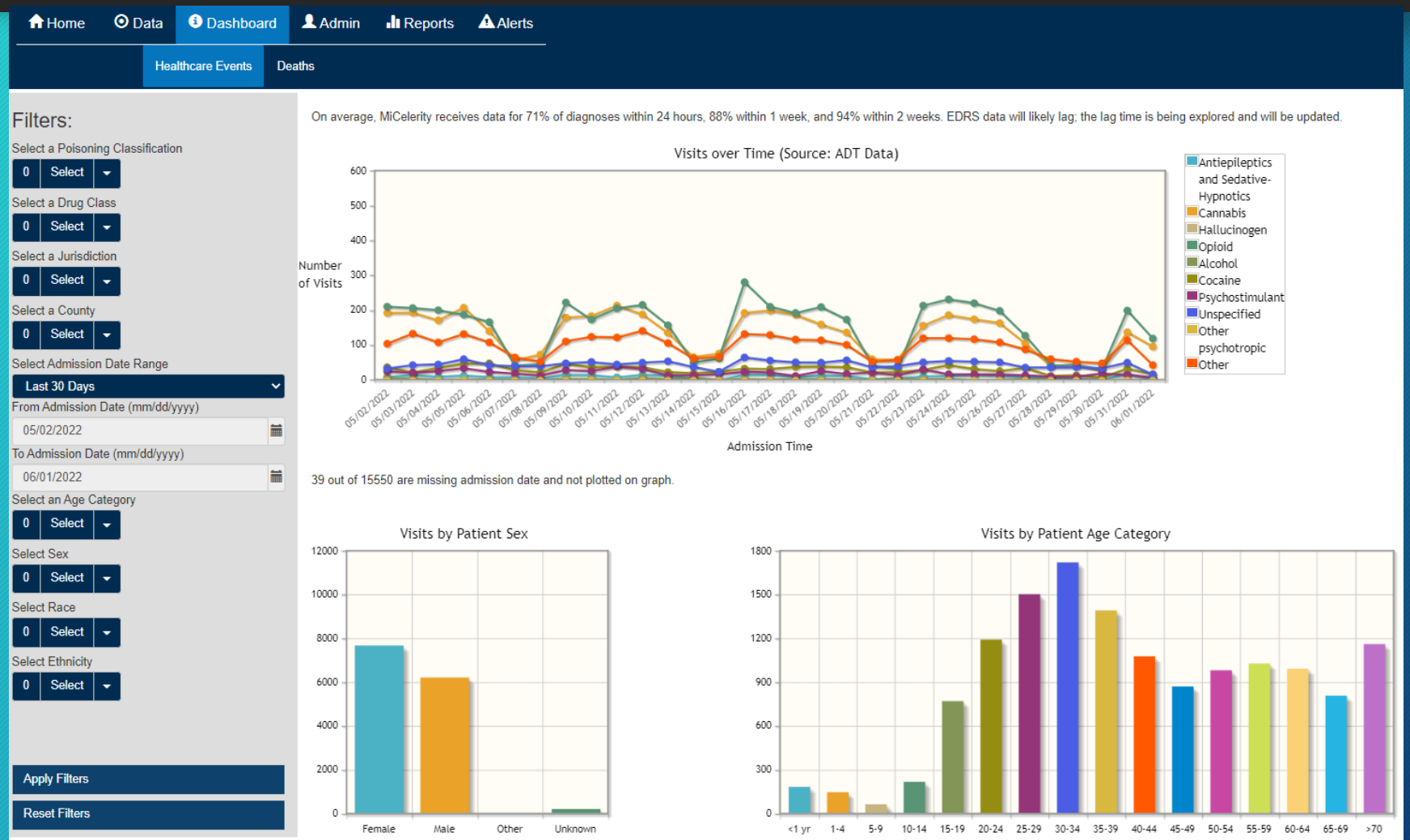
- Users' work must be relevant to addressing the overdose crisis in Michigan
- Limited to 3 users per LHD
- Epidemiologists (if available) are prioritized

MODA Public Dashboard

Michigan.gov/OpioidsData



MiCelerity Dashboard



Risk factors for experiencing multiple overdoses

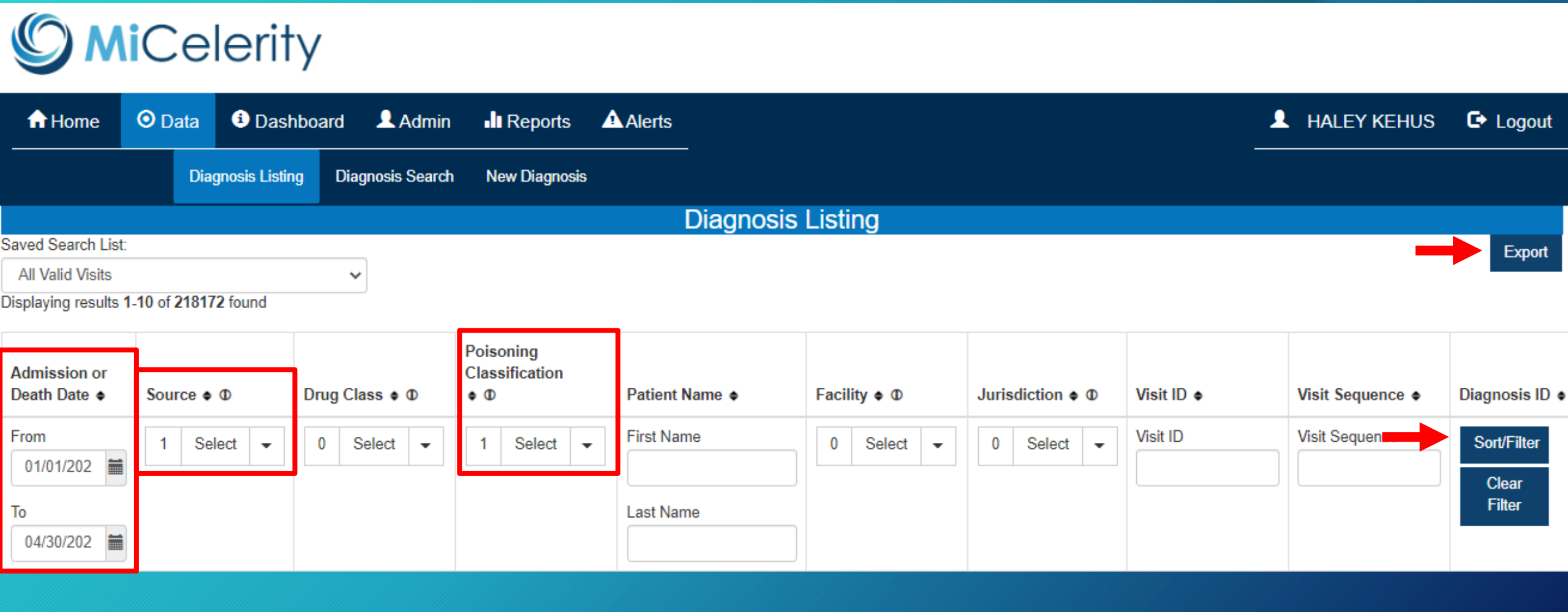
Example analysis using MiCelerity data

Goal for this analysis

- Are any groups of Michigan residents at an increased risk of experiencing a second suspected overdose?
  - Surviving a past overdose can increase a person's risk of overdosing*
  - Provide insights for substance use prevention
- Provide framework to LHDs for similar analyses

*Source: https://www.mass.gov/service-details/opioid-overdose-risk-factors

Data exported from MiCelerity

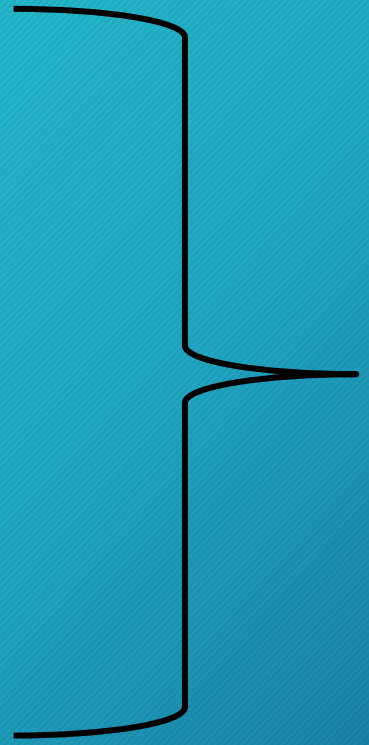


Data cleaning procedure

- Probable drug poisonings
- Deduplicated by 1) Visit ID then 2) Patient ID
- Michigan residents in Michigan Emergency Departments
- Excluded deceased cases
- Created RepeatOD variable
  - RepeatOD = 1 → more than one overdose
  - RepeatOD = 0 → only one overdose recorded

MiCelerity data for analysis

- 38,239 Michigan residents,
- accounting for 50,094 overdose events,
- between 01/01/2020 – 04/30/2022



5,871 (15.3%) residents with repeat overdoses

32,368 (84.7%) residents with only one overdose

Analysis procedure

Outcome = experiencing more than one overdose

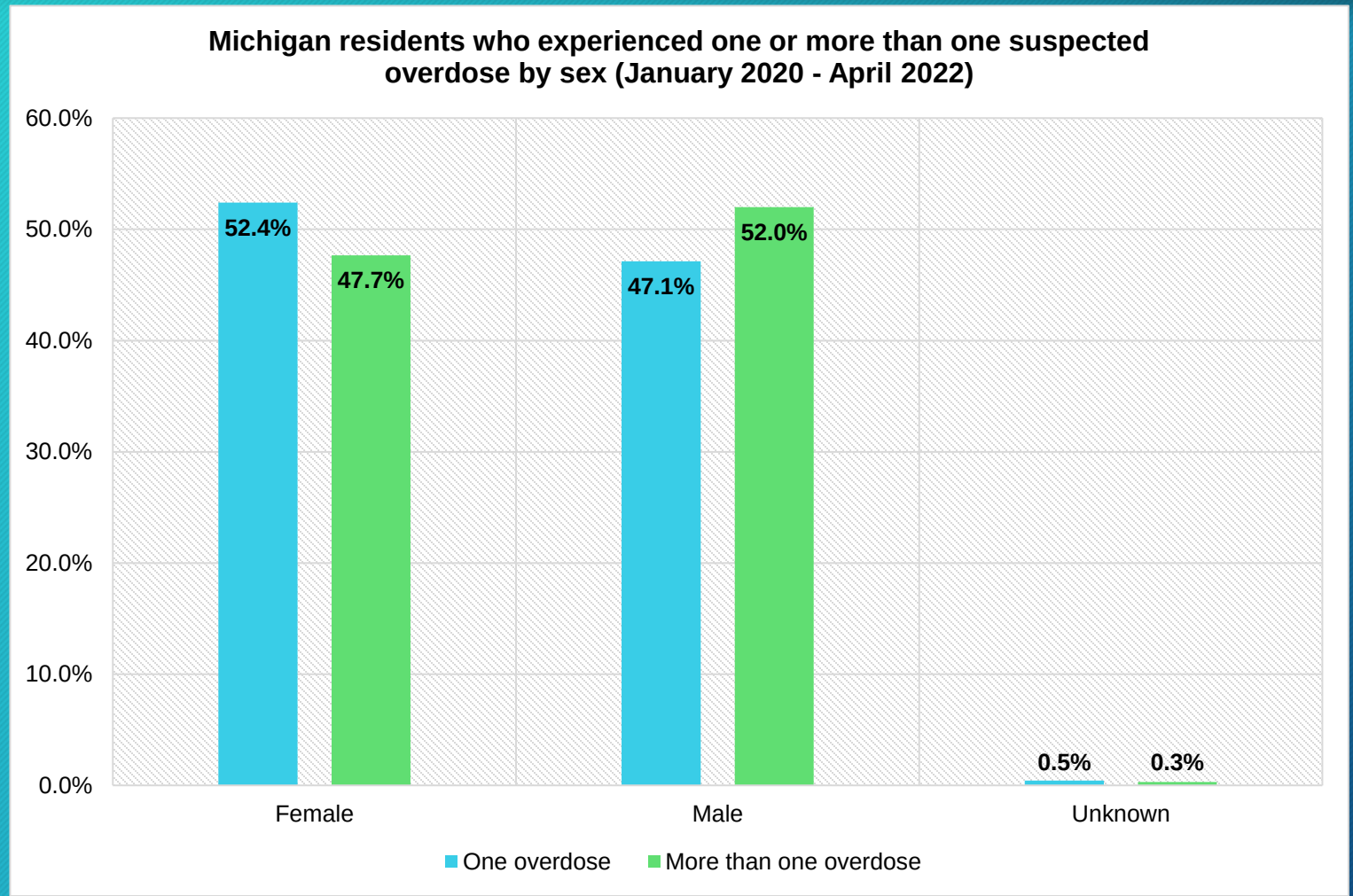
1. Univariate logistic regression

2. Assessed multivariate model for:
    1. Collinearity
    2. Interaction
    3. Confounding

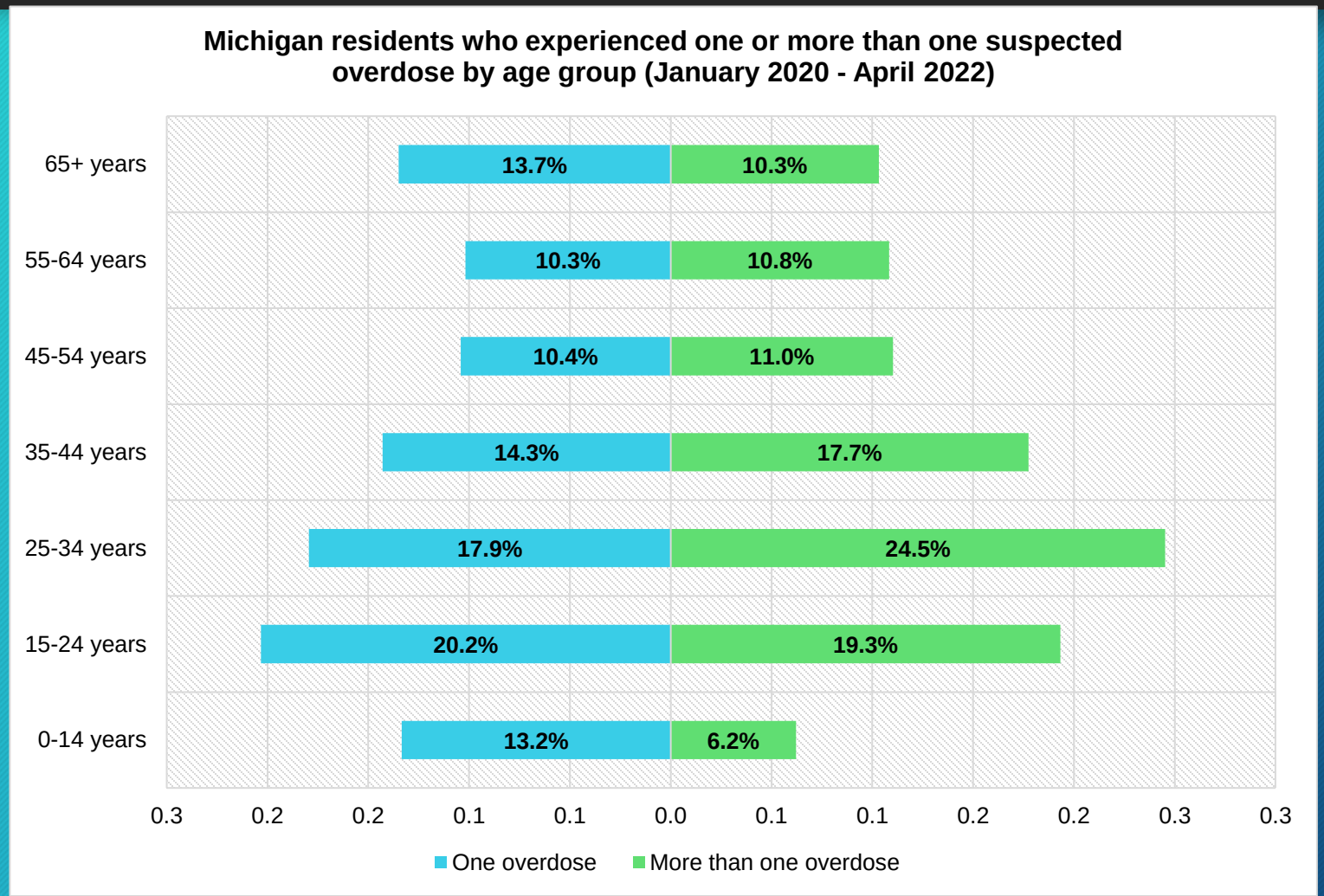
3. Present Odds Ratios from multivariate model

    Who is more likely to experience more than one overdose?

Results

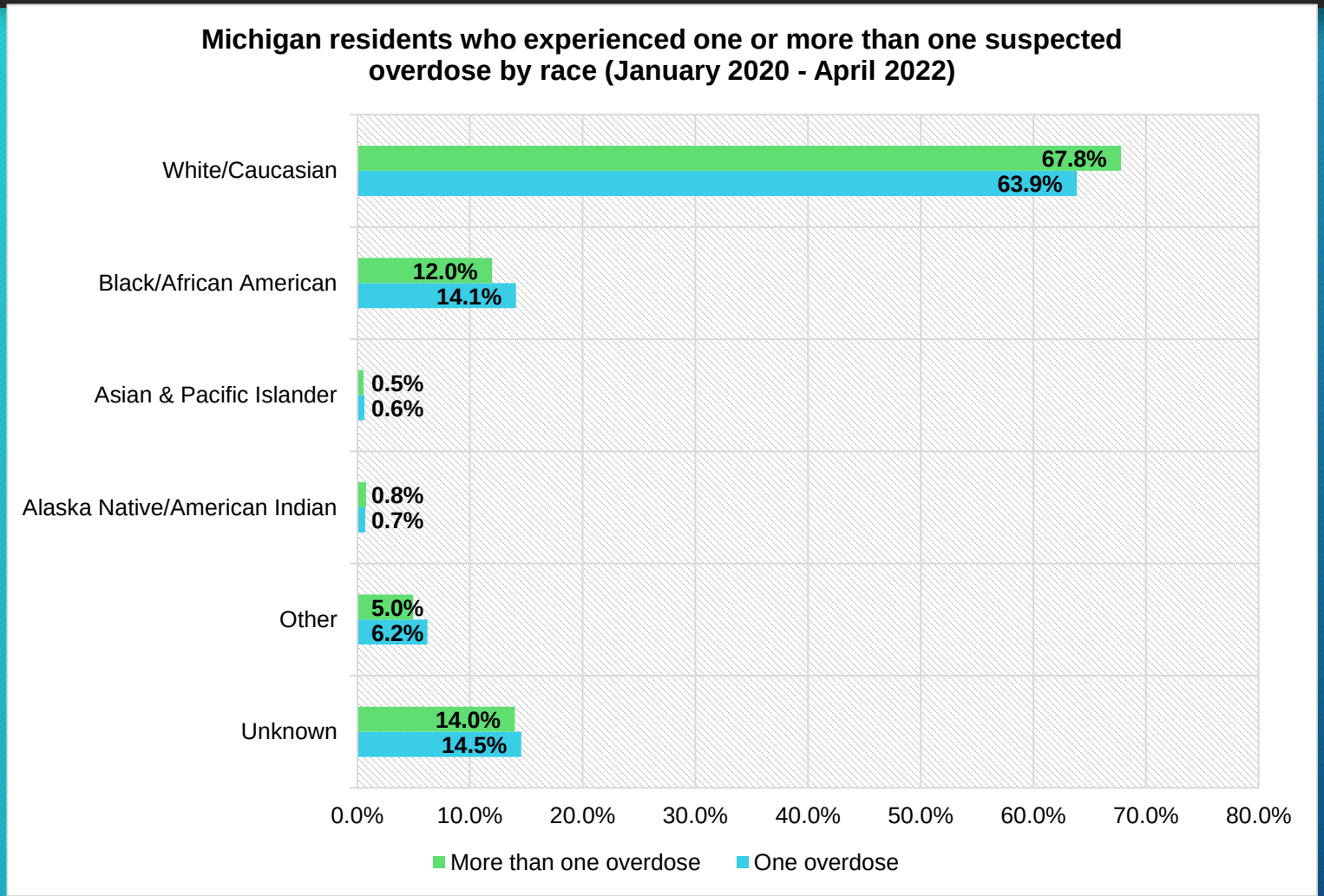

Michigan residents who experienced one or more than one suspected overdose by sex (January 2020 - April 2022)
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
52.4%
47.7%
47.1%
52.0%
0.5%
0.3%
Female
Male
Unknown
One overdose
More than one overdose

Results



Median age: 34 for both overdose categories

Results


Michigan residents who experienced one or more than one suspected overdose by race (January 2020 - April 2022)
White/Caucasian
67.8%
63.9%
Black/African American
12.0%
14.1%
Asian & Pacific Islander
0.5%
0.6%
Alaska Native/American Indian
0.8%
0.7%
Other
5.0%
6.2%
Unknown
14.0%
14.5%
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
80.0%
More than one overdose
One overdose

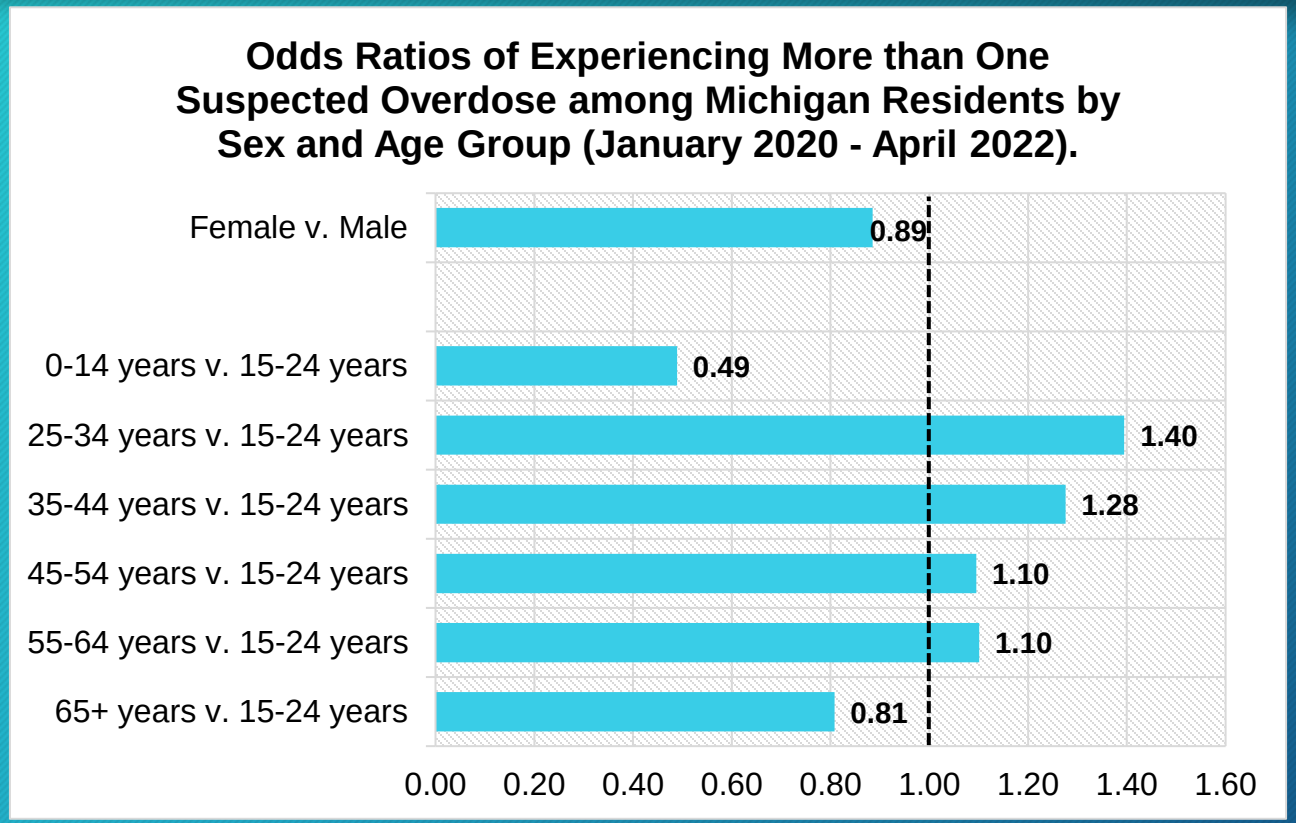
Results

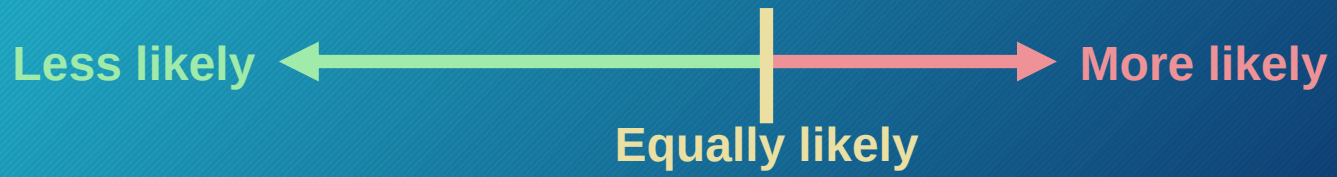
Univariate Regression Analysis of Experiencing More than One Suspected Overdose among Michigan Residents by Sex and Age Group (January 2020 - April 2022).

Variable		Odds Ratio (95% CI)	P-value
Sex			
	Female*	-	-
	Male	0.87 (0.82, 0.94)	<.0001
Age groups (years)			
	0-14	0.48 (0.42, 0.56)	<.0001
	15-24*	-	-
	25-34	1.27 (1.14, 1.40)	<.0001
	35-44	1.19 (1.07, 1.33)	0.0017
	45-54	1.05 (0.93, 1.19)	0.4044
	55-64	1.05 (0.93, 1.19)	0.4369
	65+	0.79 (0.69, 0.89)	0.0002
Race			
	White/Caucasian*	-	-
	Black/African American	0.85 (0.76, 0.94)	0.0011
	Asian & Pacific Islander	0.98 (0.63, 1.53)	0.9348
	American Indian/Alaska Native	1.10 (0.79, 1.54)	0.5705
	Other	0.84 (0.71, 1.00)	0.0530
Ethnicity			
	Non-Hispanic*	-	-
	Hispanic	0.98 (0.81, 1.19)	0.8672

**Reference group*

Results


Odds Ratios of Experiencing More than One Suspected Overdose among Michigan Residents by Sex and Age Group (January 2020 - April 2022).
Female v. Male
0.89
0-14 years v. 15-24 years
0.49
25-34 years v. 15-24 years
1.40
35-44 years v. 15-24 years
1.28
45-54 years v. 15-24 years
1.10
55-64 years v. 15-24 years
1.10
65+ years v. 15-24 years
0.81
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60


Less likely
More likely
Equally likely

Conclusions

Those who are more likely to experience more than one overdose:

- Males
  - vs females
- Cases 15-64 years old
  - vs younger cases (0-14 years old) and older cases (65+ years old)
  - Age group 15-34 years old are most likely
    - Followed by those 35-44 years old

**All statistically significant at alpha level 0.05*

Limitations to this analysis

- Years available in MiCelerity
  - January 2020 – Present
- Missing race/ethnicity data
  - 5,580 (14.4%) cases had an unknown race
  - 10,258 (26.6%) cases had an unknown ethnicity
- Model was limited to variables included in the data set
- Fatal overdoses were not included

Next steps for this analysis

- Share analysis code with LHD MiCelerity users
  - Jurisdiction-specific analyses
  - Available for SAS and R
- Incorporate fatal overdose events using EDRS data
  - Who is more likely to experience a fatal overdose?
  - How do the risk factors for a second overdose compare to the risk factors for a fatal overdose?
- Time-to-event analysis using fatal overdose data

Next steps for MiCelerity

- Insurance data for each suspected overdose
  - Retrospective data available back to April 2022
- Exploring possible data linkages:
  - EMS data (BioSpatial)
  - Data on housing and homelessness
  - Medicaid data
- Meeting with LHD users for collaboration
  - Next quarterly meeting is July 22nd

Any questions?

Thank you!

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Please contact
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if you would like access to MiCelerity