



Evaluation and quality improvement of non-fatal overdose syndromic surveillance in Philadelphia

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May 15, 2023

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City of
Philadelphia



Surveillance system **evaluation**

- Data flow and resources
- Collaborators
- System purpose
- Evaluation methods
- Recommendations

Syndromic Surveillance

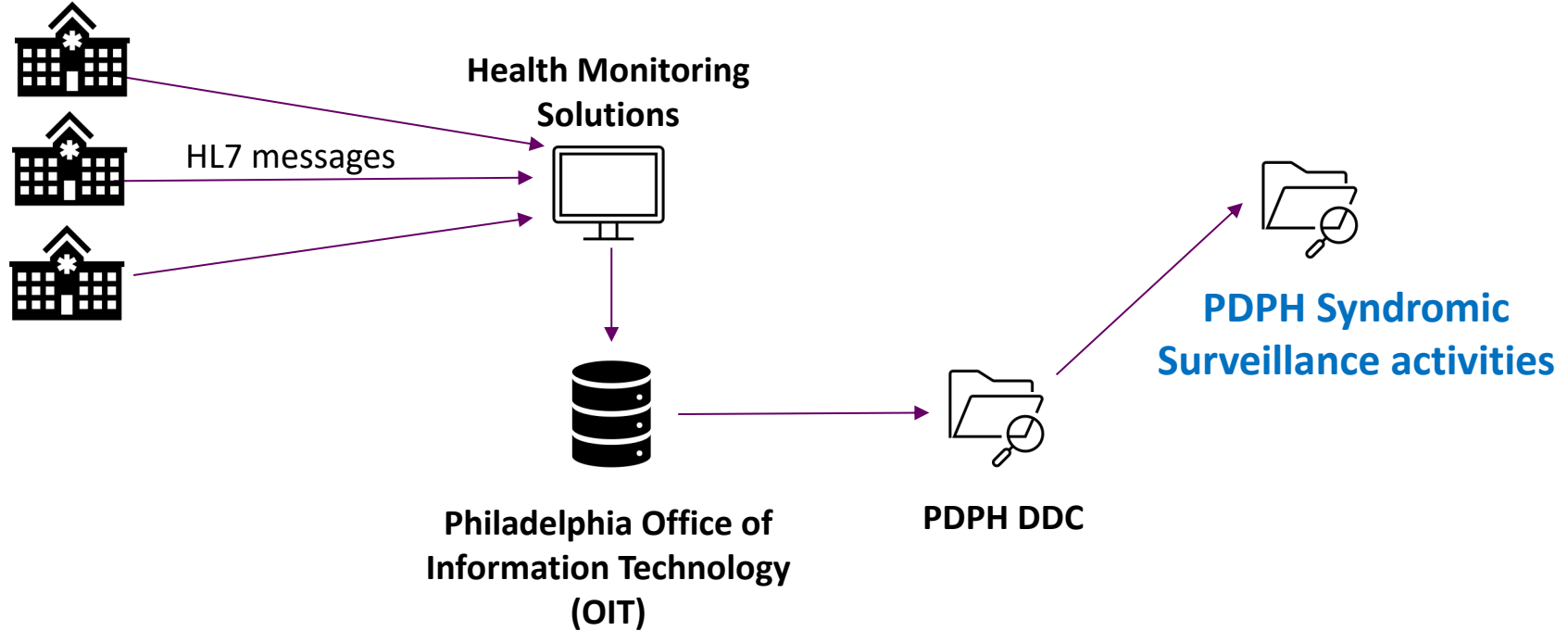
PDPH has used syndromic surveillance for a long time.

- Pennsylvania Department of Health
- Health Monitoring Systems
- Division of Disease Control
- **All 20 EDs** in Philadelphia



The data are passed through multiple entities.

Philadelphia EDs



The data go through more steps for non-fatal overdose surveillance.

Philadelphia EDs



Health Monitoring
Solutions

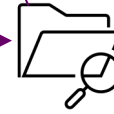
HL7 messages



Philadelphia OIT



PDPH DDC



PDPH Division of
Substance Use
Prevention and
Harm Reduction

Citywide response
strategy



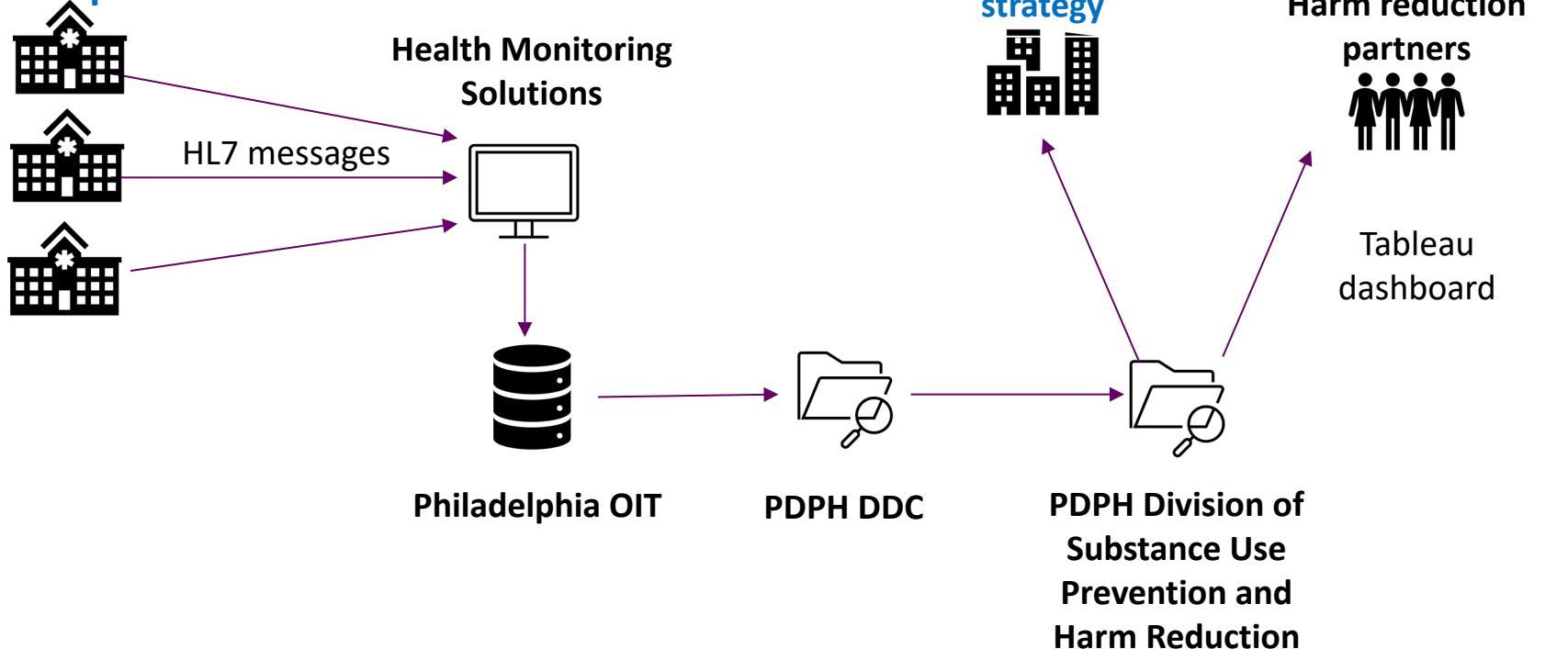
Overdose response:

Harm reduction

partners



Tableau
dashboard



Surveillance system purposes

1. Measure the burden of non-fatal overdoses and monitor overdose trends over time
2. Detect and respond to overdose increases



Evaluation methods

Surveillance system attributes

- Usefulness
- Simplicity
- Flexibility
- Data quality
- Acceptability
- Sensitivity
- Predictive Value Positive
- Representativeness
- Timeliness
- Stability
- Informatics system quality
- Informatics service quality
- Informatics interoperability

Evaluation questions:

1. How **accurate**?
2. How **useful**?



We used mixed methods.



- Qualitative interviews
- Quantitative analyses
 - Sensitivity
 - Predictive value positive
 - Data quality

Sensitivity

What is an **overdose**?

- Chief complaint
- ICD-10 code



What is an **overdose anomaly**?

- Daily cases ≥ 2 **standard deviations above the average** daily cases during same month in the previous year

October 1, 2022 compared to...

...October 2021 daily average



We defined confirmed and probable cases.

Confirmed overdose case:

- Chief complaint
- ICD-10 code
- **No suicidal intent**
- **No accidental medication overdose**

Probable case:

- Chief complaint
- Missing ICD-10 code



Overdose case sensitivity was 100%.

- Simple random samples of 1003 cases and 1000 non-cases (2021)

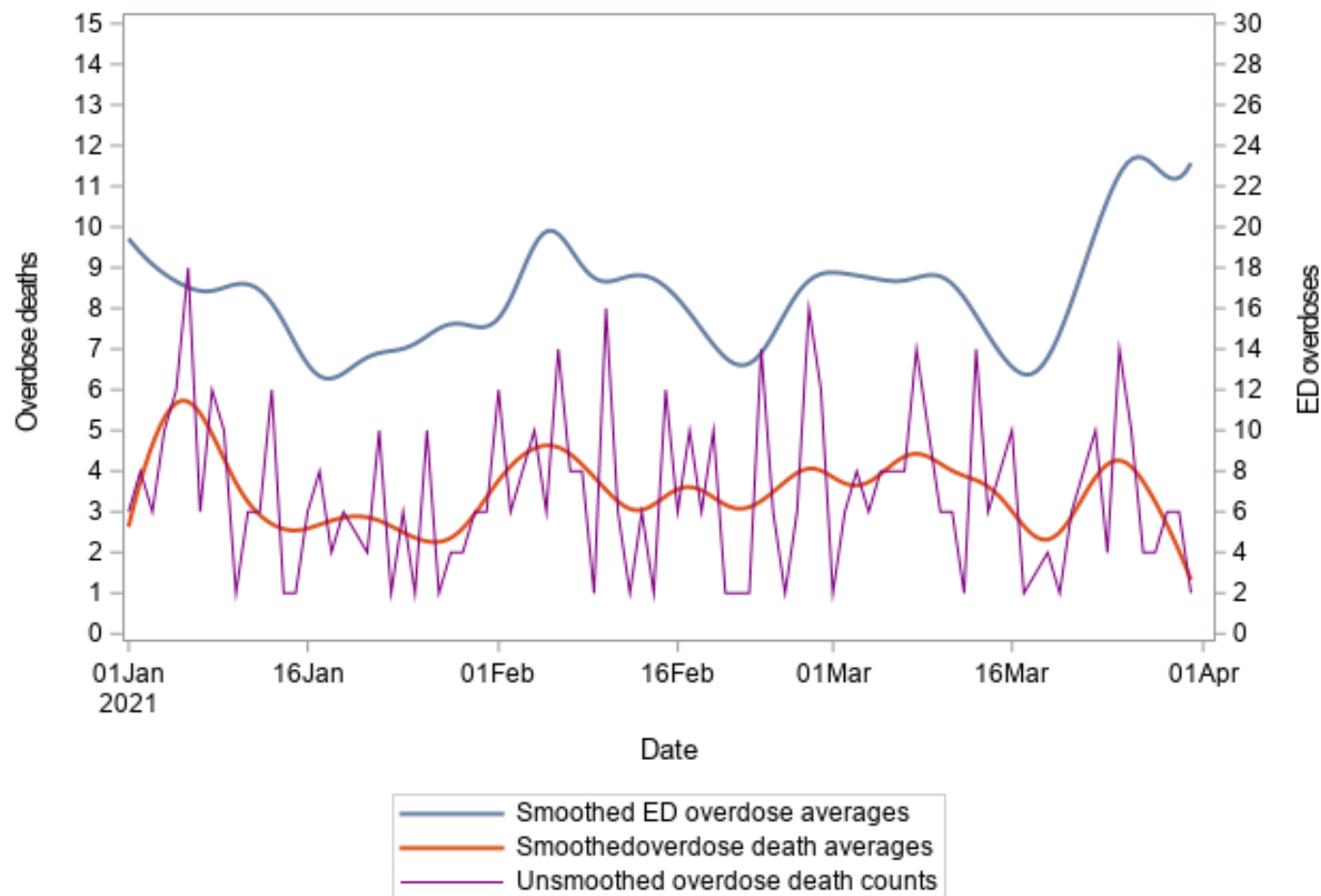
	Manual review: confirmed or probable case	Manual review: non-case
Macro-identified: case	899	104
Macro-identified: non-case	0	1000

Overdose anomaly sensitivity was 23.5%.

- ED anomalies compared to overdose death anomalies (2021)

	MEO data: Anomaly defined	MEO data: No anomaly defined
ED system: Anomaly defined	4	30
ED system: No anomaly defined	13	318

Daily overdoses (ED data and MEO data) from January 1-March 31, 2021 with smoothed averages



Predictive Value Positive

Overdose case predictive value positive (PVP) was 83.3%

- Simple random sample of 1000 ED visits (2021)

	Manual review: confirmed or probable case	Manual review: non-case
Macro-identified: case	5	1
Macro-identified: non-case	0	994

Overdose anomaly predictive value positive (PVP) was 11.8%

- ED anomalies compared to overdose death anomalies (2021)

	MEO data: Anomaly defined	MEO data: No anomaly defined
ED system: Anomaly defined	4	30
ED system: No anomaly defined	13	318

Usefulness

The system is useful to measure burden of overdoses for PDPH's purposes.

- PDPH uses for **routine surveillance and reports**
- **Not used** by Emergency Medical Services or hospitals



USEFULNESS

The system has been used to respond to anomalies.

- From anomaly detection: <24 hours to response
- **No formal response** established

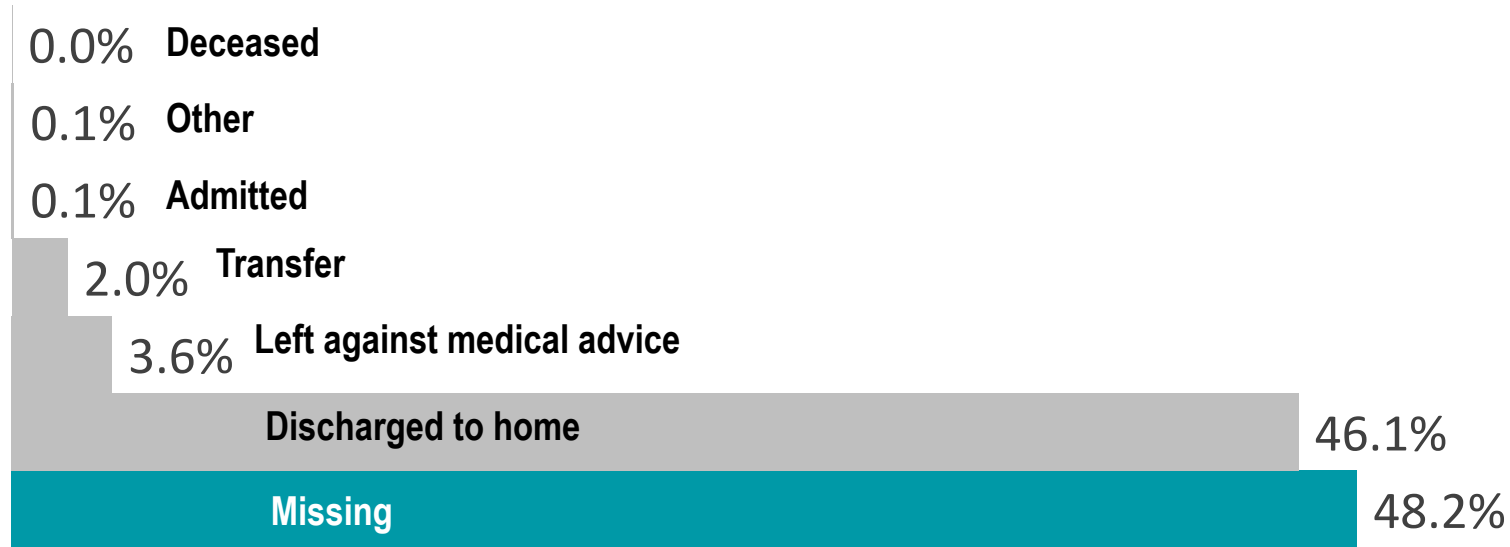


USEFULNESS

Data Quality

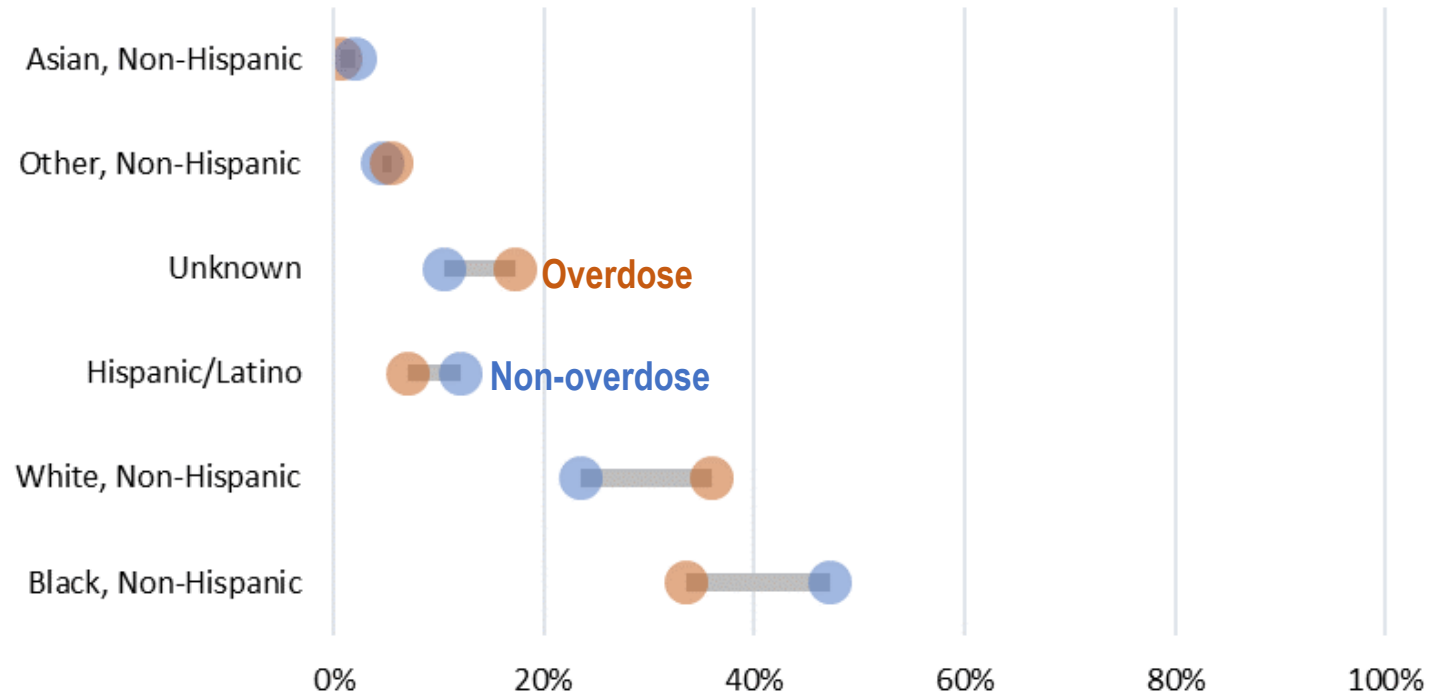
Many ED visits were missing the discharge disposition.

Over 900,000 ED visits



More overdose ED visits were missing race than non-overdose ED visits.

Almost 7,000 ED (<1%) substance overdose visits



Philadelphia Emergency Department data (2021)



Were ED data updated?

No individual observations were updated from day to day.



Recommendations

Recommendations

Redefine
overdose
anomaly

Develop
quality
assurance

Future
investigations

Overdose
response
protocols

Quality assurance

```

**recode ethnicity;
  if ethn in ("2135-2" "CUBAN" "MEXICAN" "PUERTO") then ethn_rev = "Hispanic or Latino";
  else if ethn in ("2186-5" "2186-5ON-2" "NOT HISPAN") then ethn_rev = "Not Hispanic or Latino";
  else if race in ("HISPAN" "HISPANIC" "LATINO" "2135-2" "CUBAN" "MEXICAN" "PUERTO") then ethn_rev = "Hispanic
or Latino";
  else ethn_rev = "Unknown";
**recode race;
  if race in ("2106-3" "WHITE") then race_rev = "White";
  else if race in ("2054-5" "BLACK") then race_rev = "Black";
  else if race in ("2028-9" "2029-7" "VIETNA" "CHINES" "ASIAN" "FILIPPI" "JAPANE" "KOREAN") then race_rev =
"Asian";
  else if race in ("1002-5" "1004-1" "2076-8" "2131-1" "2500-7" "OTHER" "AM IND" "GUAM/C" "INDIAN" "NATIVE") then
race_rev = "Other";
  else race_rev = "Unknown";
**compile;
  if ethn_rev = "Hispanic or Latino" then race_eth_rev="Hispanic or Latino";
  else if race_rev="White" then race_eth_rev="NH, White";
  else if race_rev="Black" then race_eth_rev="NH, Black";
  else if race_rev="Asian" then race_eth_rev="NH, Asian";
  else if race_rev="Other" then race_eth_rev="NH, Other";
  else race_eth_rev="Unknown";
run;

```

Tableau for quality assurance

- **Including** revised macro overdoses
- **Excluding** current macro overdoses
- Line list **chief complaint** (e.g. fell out, found down, alcohol poisoning)
- Line list **discharge diagnosis** (e.g. F19.920, R41.82)

Tableau for quality assurance

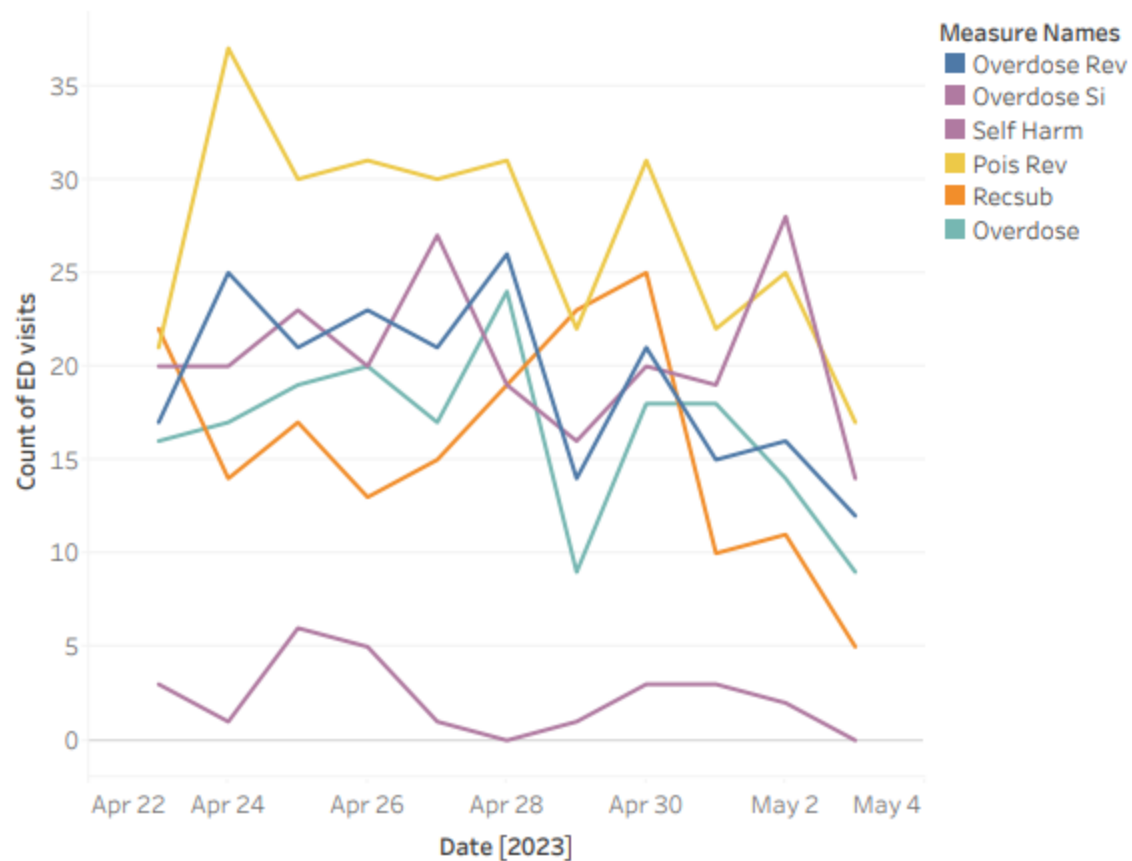
- **Excluding** revised macro overdoses
- **Including** current macro overdoses
- Line list **chief complaint** (e.g. suicidal, overdose)
- Line list **discharge diagnosis** (e.g. T50.902A, J9801)

Tableau for quality assurance

- **Including** revised macro overdoses and current macro overdoses
- **Excluding** “overdose” in the chief complaint
- Line list **chief complaint** (e.g. Narcan given, pt apnic)
- Line list **discharge diagnosis** (e.g. T40.2X1A)

Future plans

ED overdose-related metrics





Questions for the group:

- **Others' experience**

- Do you include observations with missing categories?
- How soon after the visit do you receive the data?
- Do you have quality assurance activities in place (frequency, content)?

- **Forecasting**

- What do you recommend as we think about forecasting the relationship of overdose deaths with ED overdose visits and EMS overdose encounters?





References

1. National Center for Health Statistics. U.S. overdose deaths In 2021 increased half as much as in 2020 – But are still up 15%. Centers for Disease Control and Prevention. Updated May 11, 2022. Accessed October 14, 2022.
https://www.cdc.gov/nchs/pressroom/nchs_press_releases/2022/202205.htm
 2. Philadelphia Department of Public Health. Unintentional Drug Overdose Fatalities in Philadelphia, 2021. CHART. Accessed October 31, 2022. <https://www.phila.gov/media/20221026113548/CHARTv7e3.pdf>
 3. National Syndromic Surveillance Program. What is syndromic surveillance? Centers for Disease Control and Prevention. Updated April 29, 2022. Accessed October 14, 2022. <https://www.cdc.gov/nssp/overview.html>
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