

Using syndromic surveillance to inform public health action: A behavioral health perspective

3:45PM EST | November 18th, 2021 | 2021 SyS Symposium

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Overview

- Reflect back
- Brief overview of New York City's approach to drug-related syndromic surveillance
- Examples of how this data has driven public health action
- Lessons for public health surveillance

ORIGIN OF SYNDROMIC SURVEILLANCE IN NYC

NYC's syndromic surveillance system originated out of the events of September 11th

9/11

NYC Health Department and the Centers for Disease Control began planning for ongoing syndromic surveillance in New York City

9/13

Medical epidemiologist trained ED staff in data collection

9/14

Data collection began, assisted by Epidemic Intelligence Officers (EIOs) dispatched to 15 emergency departments in New York City

Patient Imprint Card or Label

If imprint card is unavailable:

Last Name: _____

First Name: _____

Med Rec #: _____

☐ Female ☐ Male

NEW YORK CITY DEPARTMENT OF HEALTH ENHANCED EMERGENCY ROOM SURVEILLANCE

Instructions: FOR EACH PATIENT SEEN AT THE EMERGENCY DEPARTMENT

1. Stamp form at top left with patient imprint card
2. Triage/registration and health care provider fill out respective sections
3. Place in drop box

Hospital Code

Triage/Registration Complete This Section

Date of visit: _____

Age: _____ For age less than one year please use "1"

Home Zip Code: _____ Work Zip Code: _____

Was patient in southern Manhattan (below Canal St) on Tuesday, September 11th after the attack? (circle one) YES NO Don't Know

Health Care Provider Complete This Section

Please check the ONE PREDOMINANT syndrome from the following list that best represents the PRIMARY condition of the patient

- ☐ None of the following
- ☐ Trauma
- ☐ Smoke or dust inhalation
- ☐ Exacerbation of underlying respiratory condition (Asthma/ COPD)
- ☐ Anxiety reaction (including somatic complaints, insomnia)
- ☐ Diarrhea / gastroenteritis (including vomiting or abdominal cramps)
- ☐ Upper or lower respiratory infection WITH fever
- ☐ Sepsis or non-traumatic shock
- ☐ Rash WITH fever (do NOT check unless both are present)
- ☐ Meningitis, encephalitis, or unexplained acute encephalopathy
- ☐ Botulism-like syndrome (cranial nerve impairment and weakness)
- ☐ Unexplained death with a history of fever

IF YOU HAVE ANY QUESTIONS OR NEED TO REACH THE NYC DEPARTMENT OF HEALTH, PLEASE CALL 212-447-2676 AND ASK FOR THE DOCTOR ON DUTY. IF NO ONE IS AVAILABLE AT THAT NUMBER, CALL THE POISON CONTROL CENTER AT 212-764-7667.

Implementation of electronic ED syndromic surveillance

- Electronic ED reporting of syndromic data began November 2001
- Goal: identify naturally occurring or intentional infectious diseases
- Originally, four syndromes analyzed:
 - Respiratory, fever (includes influenza-like illness), diarrhea, and vomiting
- Analysis performed at the level of hospital and residential ZIP code
- From 2002 – 2003 more than 40 spatial signals investigated by DOHMH, none conclusively identified as an infectious disease outbreak

SYNDROMIC SURVEILLANCE FOR DRUG-RELATED MORBIDITY

Monitoring drug-related morbidity using ED syndromic surveillance data

- Syndromic surveillance data analyzed by classifying ED visits into one or more drug syndromes based on the chief complaint
 - 25 syndromes, including overdose, mentions of specific drugs, withdrawal, etc.
- Automated daily analysis, visualization, and distribution
- Investigate concerning signals following a protocol

Two strategies for analyzing syndromic surveillance data

Daily analysis

- Focused on identifying clusters or outbreaks
- This gets the most attention

Trend analysis

- Identify emerging issues
- Understand the trajectory of overdose epidemic
- Tends to guide public health decision making (for overdose in particular)

Identifying potential outbreaks or clusters

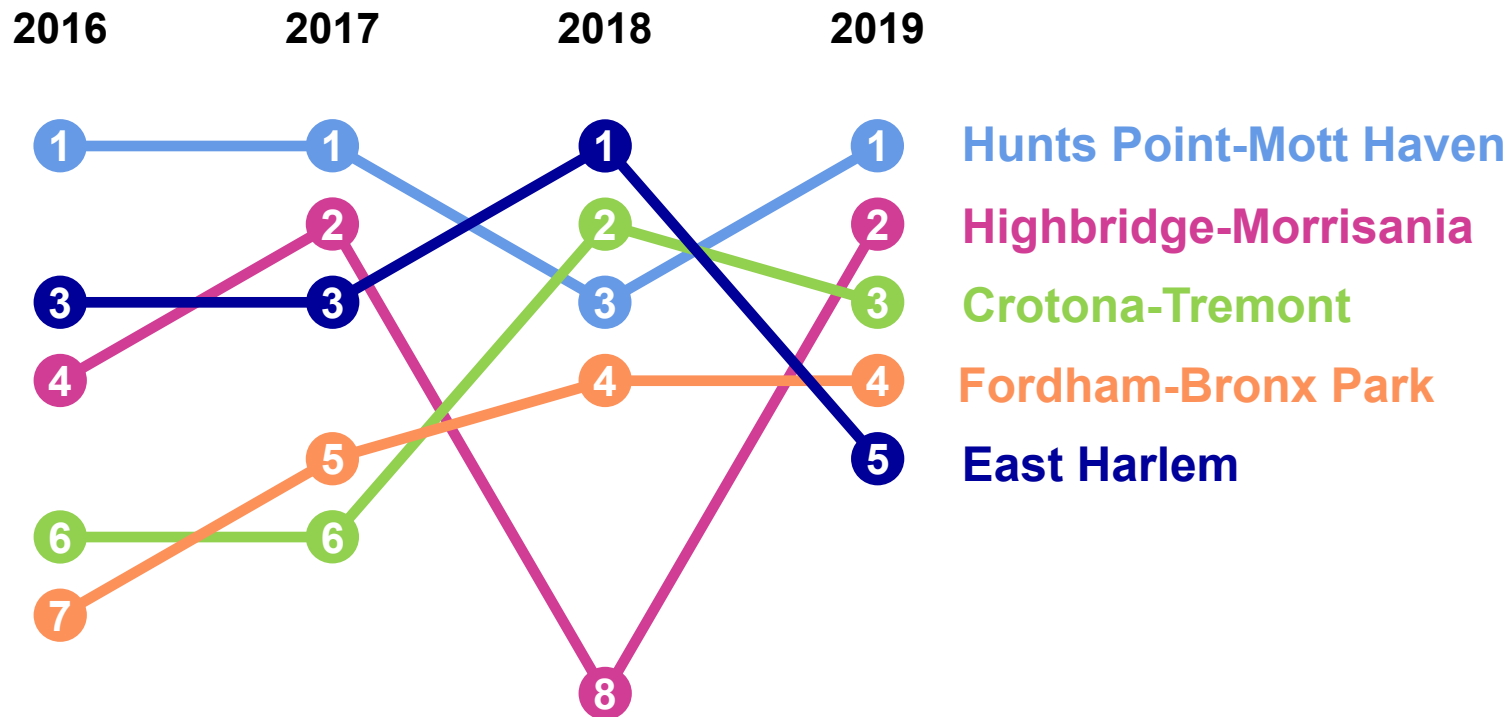
- The essential comparison is observed versus expected
 - Need on historical data
- Many different aberration detection methods
 - Range in complexity, time periods compared

Trend approach to syndromic surveillance

- Aggregate data across units, often geography, and time intervals
 - Units with small numbers of ED visits may need larger time intervals
- Plot change overtime
 - Can perform formal trend tests or visually inspect data

Clusters of drug overdose deaths play a largely insignificant role in driving overdose mortality in New York City

Five highest neighborhoods ranked by overdose rates in 2019 and rank in prior years, 2016-2019



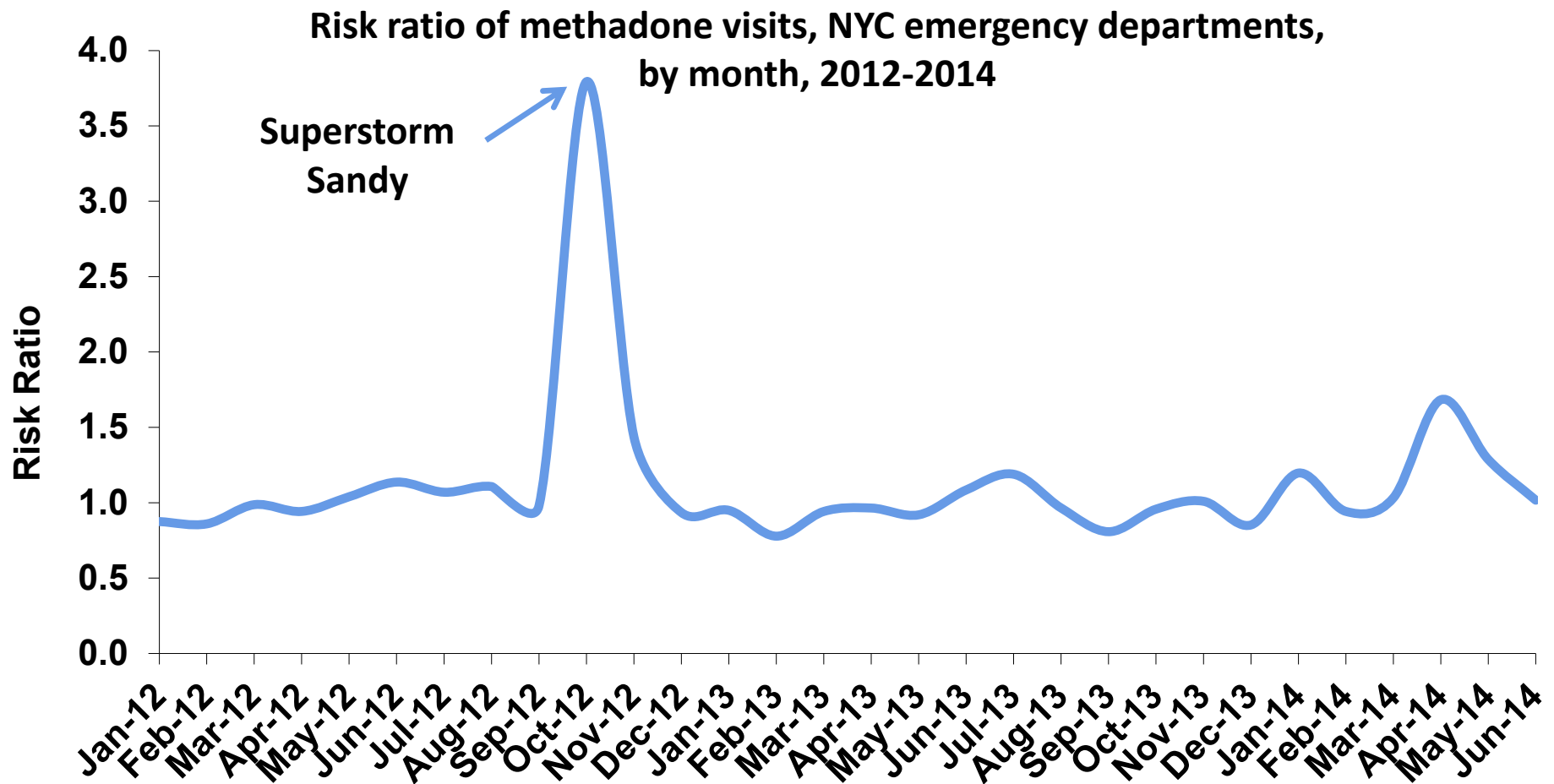
Principles that guide our analyses

- Analysis of data driven by subject matter expertise
- Look for clusters and outbreaks but primarily use syndromic data to monitor trends
- Automate “first pass” analyses and devote analytic resources to understanding specific changes, developing methods, recommending public health action

USING SYNDROMIC SURVEILLANCE TO INFORM PUBLIC HEALTH DECISIONS: BEHAVIORAL HEALTH EDITION

EVENT BASED SURVEILLANCE

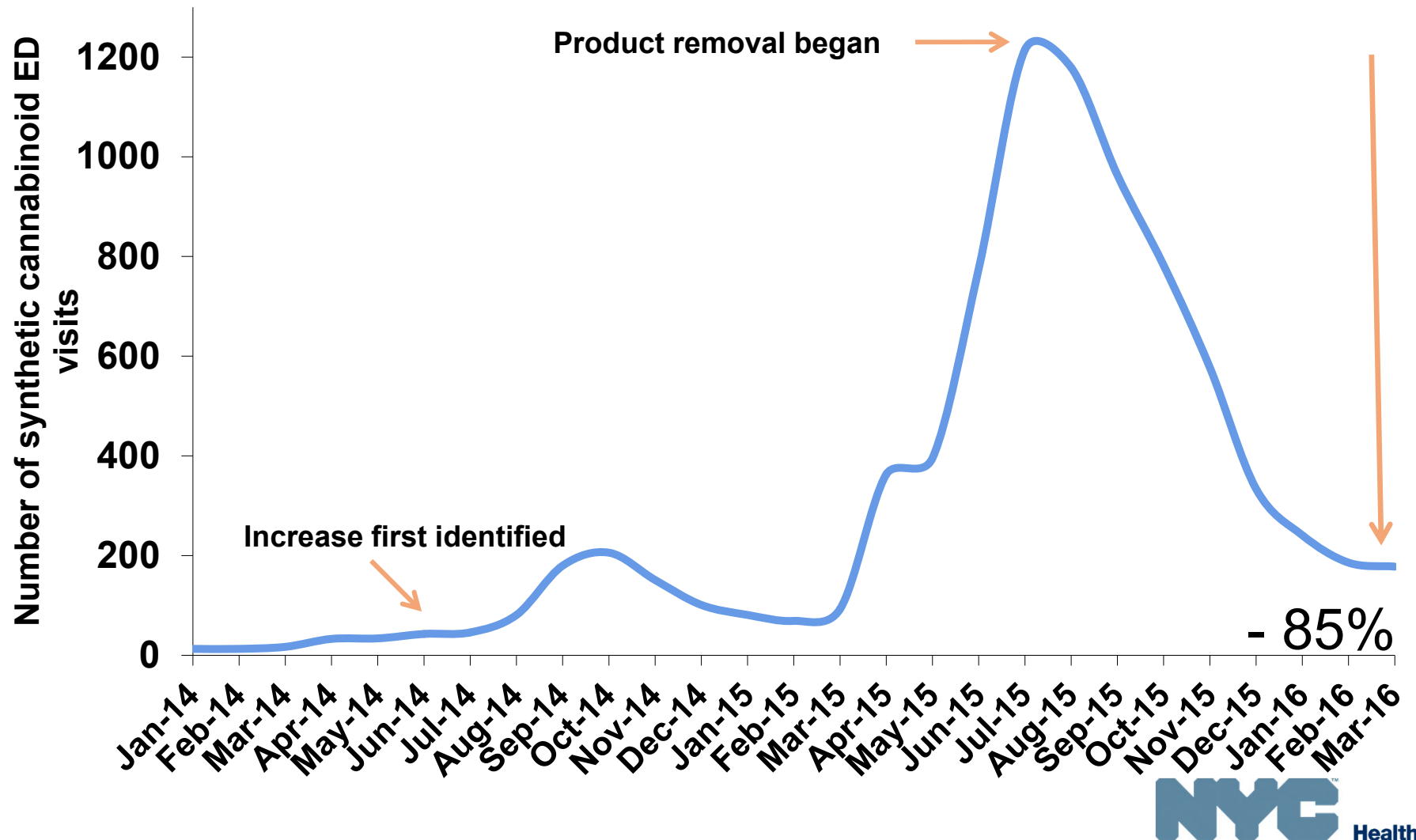
Syndromic detected an increase patients arriving at hospitals for methadone treatment during Superstorm Sandy, prompting outreach



Source: New York City Department of Health & Mental Hygiene, Syndromic Surveillance System

IDENTIFY EMERGING PUBLIC HEALTH PROBLEM

Trend in K2-related emergency department visits, NYC, January 2014 – March 2016



Source: New York City Department of Health and Mental Hygiene, Syndromic Surveillance, synthetic cannabinoid syndrome, 01/01/14 – 03/31/16

Novel use of syndromic surveillance to monitor the impact of synthetic cannabinoid control measures on morbidity



Michelle L. Nolan^{1*} , Amy Ehntholt², Thomas Merrill³, Don Weiss⁴, Ramona Lall⁴ and Denise Paone¹

Table 1 Impact of synthetic cannabinoid control measures on emergency department (ED) visits, New York City, 2015

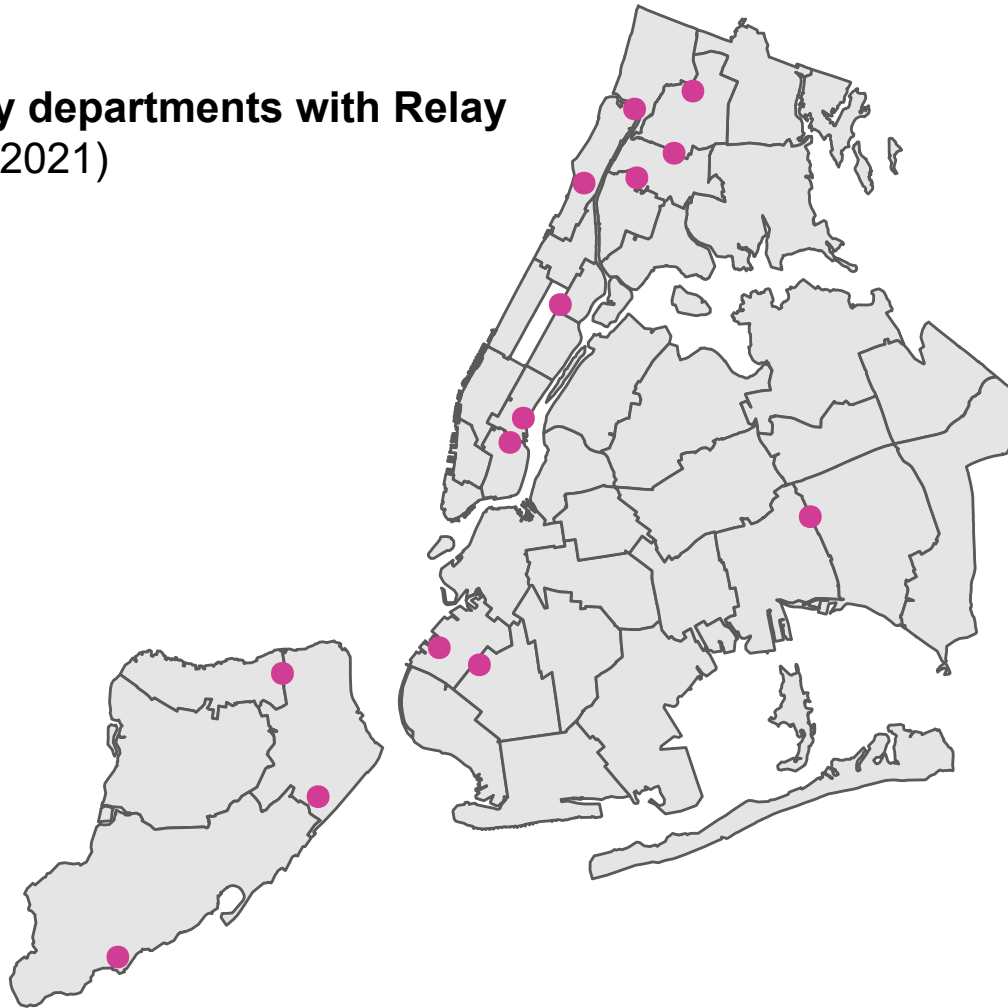
	ED visit 10 days pre-intervention		ED visits 10 days post-intervention		Difference
	Number	Rate	Number	Rate	
Intervention					
A (Treatment)	33	117.2	22	78.1	− 39.1
A (Neighborhood control)	30	23.6	29	22.8	− 0.8
A (City control)	116	1.7	111	1.6	− 0.1
<i>Difference-in-difference (Treatment - Neighborhood)</i>					− 38.3
<i>Difference-in-difference (Treatment - City)</i>					− 39.0
B (Treatment)	40	142.0	24	85.2	− 56.8
B (Neighborhood control)	47	36.9	43	33.8	− 3.1
B (City control)	341	5.0	327	4.8	− 0.2
<i>Difference-in-difference (Treatment - Neighborhood)</i>					− 53.7
<i>Difference-in-difference (Treatment - City)</i>					− 56.6
C (Treatment)	330	4.8	232	3.4	− 1.4

Notes. Rates expressed per 100,000 New York City residents
A-Commissioner's Order served to stores in a single ZIP code
B-Product removal in a single ZIP code
C-Citywide product removal

ALLOCATE PUBLIC HEALTH RESOURCES

Syndromic surveillance data used to select EDs for Relay, NYC's non-fatal overdose response program

● Emergency departments with Relay
(as of April 2021)



INFORM PUBLIC HEALTH MESSAGING

Syndromic data used in public health messaging about increase in alcohol-related ED visits around New Year's

NYC, We Love You, Celebrate New Year's Eve Safely

Dear NYC,

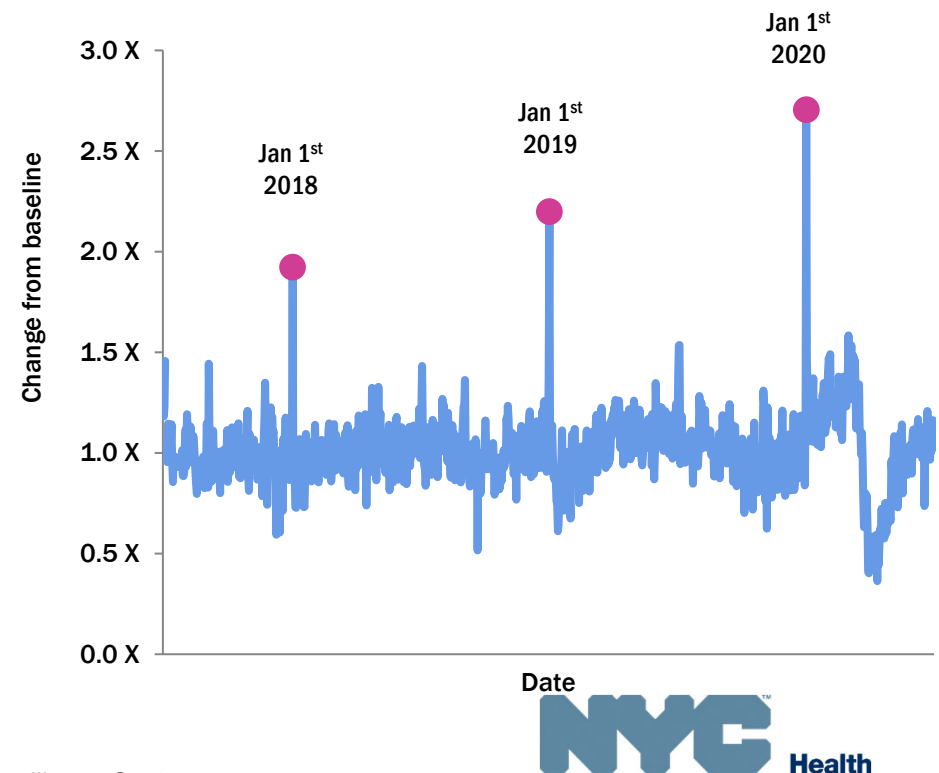
The best thing about 2020 is that it's finally over.

It's been a long year and however you mark its end, we won't judge. But we do want you to be safe. So here are some tips from the NYC Health Department for your New Year's Eve.

Celebrating will look a little (or a lot) different than it has in previous years. To stay safe and stop the spread of COVID-19, remember these key actions: stay home, stay apart (at least six feet of distance), wear a face covering, and keep your hands clean. And get tested!

If you're going to drink alcohol, try to decide ahead of time how much you plan to consume. Eat dinner first and enjoy snacks throughout the evening. Pace yourself and drink non-alcoholic beverages to stay hydrated. And please, please, please be mindful of the medications you are taking and if they may increase the effect of alcohol on your body.

Alcohol-related emergency department visits spike each New Year in New York City



Syndromic surveillance data prompted release of low tolerance guidance



Drug Tolerance and Risk of Overdose

The COVID-19 pandemic has affected peoples' lives in many ways. Significant disruptions to daily routines, including the ways people access and use drugs, displacement from normal surroundings, COVID-related isolation, and more, can affect drug tolerance and lead to an increased risk of overdose, especially for people who use opioids.

What is Tolerance and Why Does it Matter?

Tolerance is how your body adapts to regular use of a drug over time. As you develop tolerance to a drug, you will usually need more of it to feel the desired effect. If you have not developed a tolerance, or if your tolerance is lower, just a small amount of a drug can increase your risk of overdose.

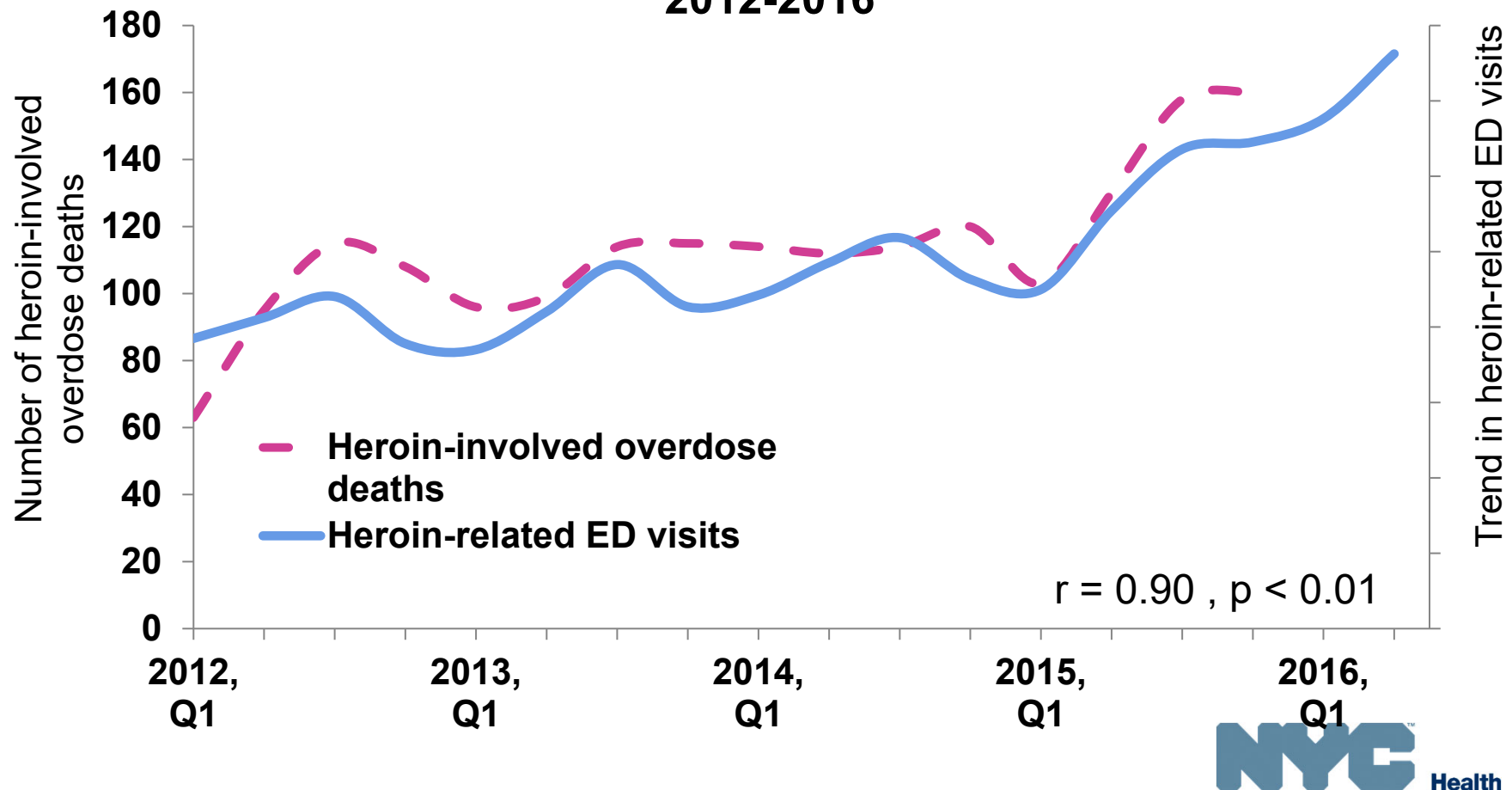
Your tolerance decreases if you:

- Stop or take a break from using a drug
- Reduce the amount of drugs you use, even if only for a short time
- Change the type of drug you are using
- Change how you take your drugs
- Use drugs that are not as strong as you are used to, even if only for a short time

EARLY WARNING FOR MORTALITY TRENDS

Syndromic data used to predict trends in mortality data; initiate quicker response

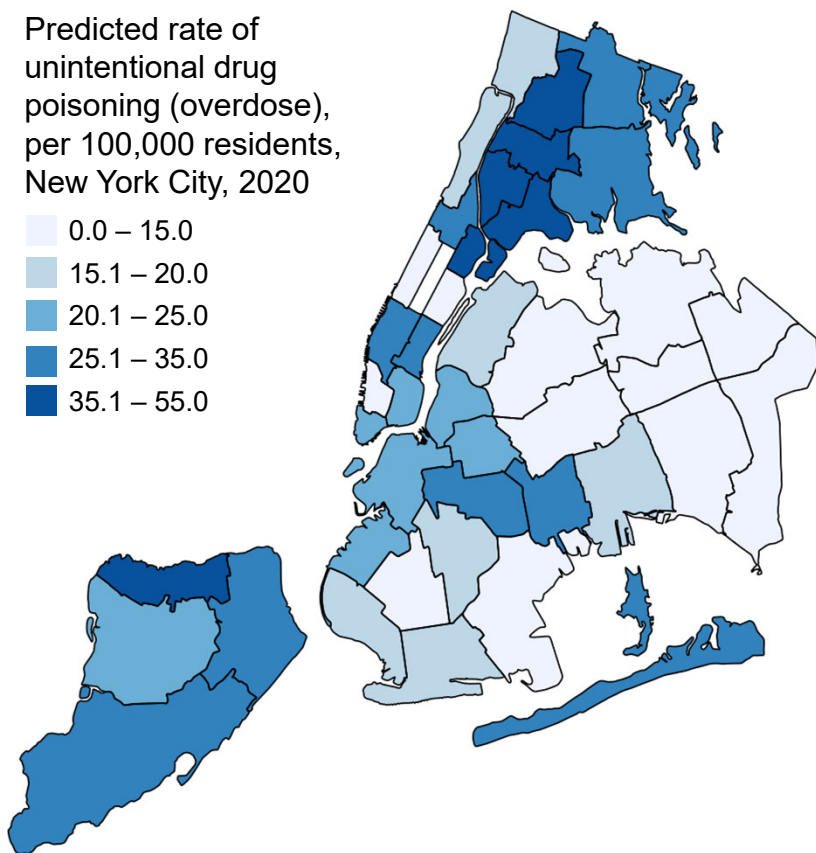
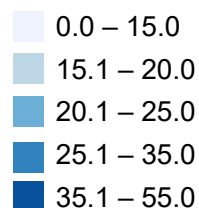
Heroin-involved overdose deaths compared to trend in heroin-related ED visits, by quarter, New York City, 2012-2016



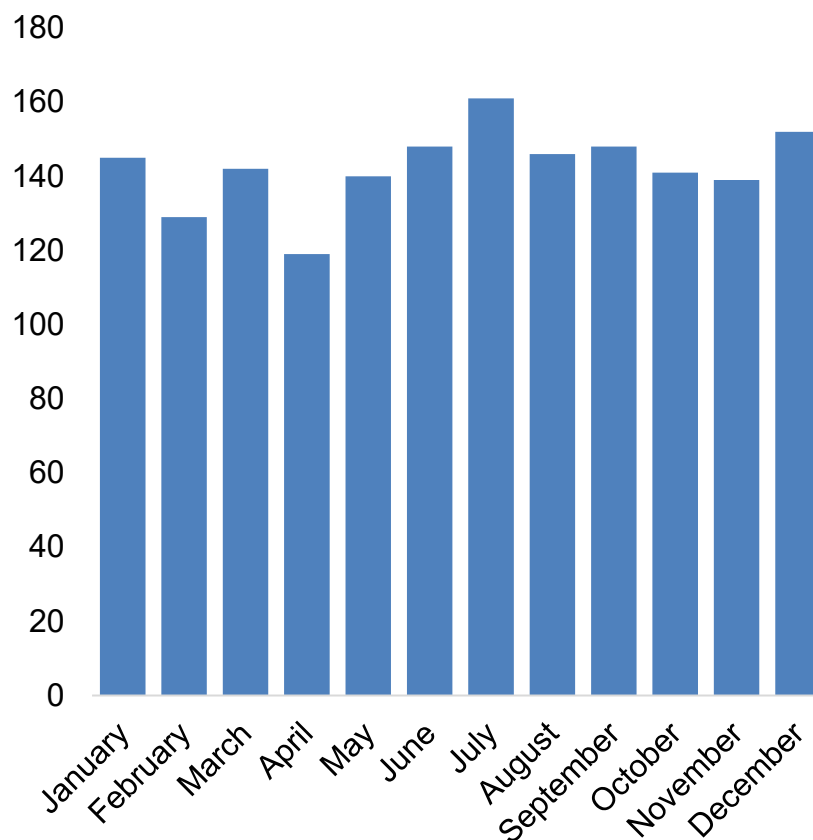
Predicted overdose deaths, New York City, January 2020 – December 2020

**Predicted overdose deaths,
by neighborhood of residence, 2020**

Predicted rate of
unintentional drug
poisoning (overdose),
per 100,000 residents,
New York City, 2020

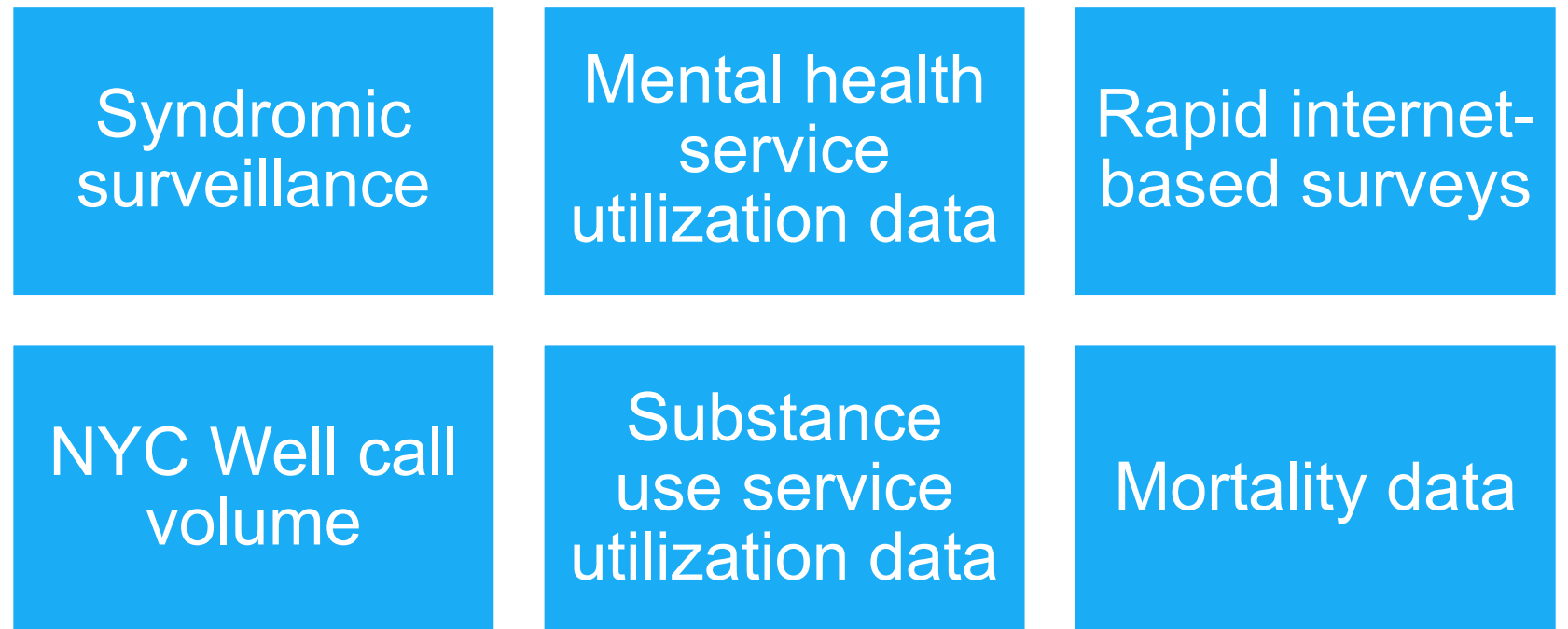


Predicted overdose deaths, by month, 2020



MONITORING BEHAVIORAL HEALTH AND SERVICES DURING COVID

Behavioral health syndromic data analyzed and presented alongside other data sources to understand the pandemic's impact



Most timely (daily)  **Least timely (long lags or delays)**

APPLYING LESSONS FROM SYNDROMIC SURVEILLANCE TO PUBLIC HEALTH SURVEILLANCE

Translating lessons learned from syndromic to public health surveillance

- Do not wait for “perfect” data to take public health action
 - Inaction is also an action
- Build response capacity into staffing plans
- Automating and deskilling data analysis has its downsides
- Curiosity is a necessity

Acknowledgements

- Denise Paone
- Hillary Kunins
- Ramona Lall and the New York City Department of Health and Mental Hygiene, Bureau of Communicable Diseases, Syndromic Surveillance Unit

THANK YOU