Drug product testing in public health investigations: Lessons learned

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Background

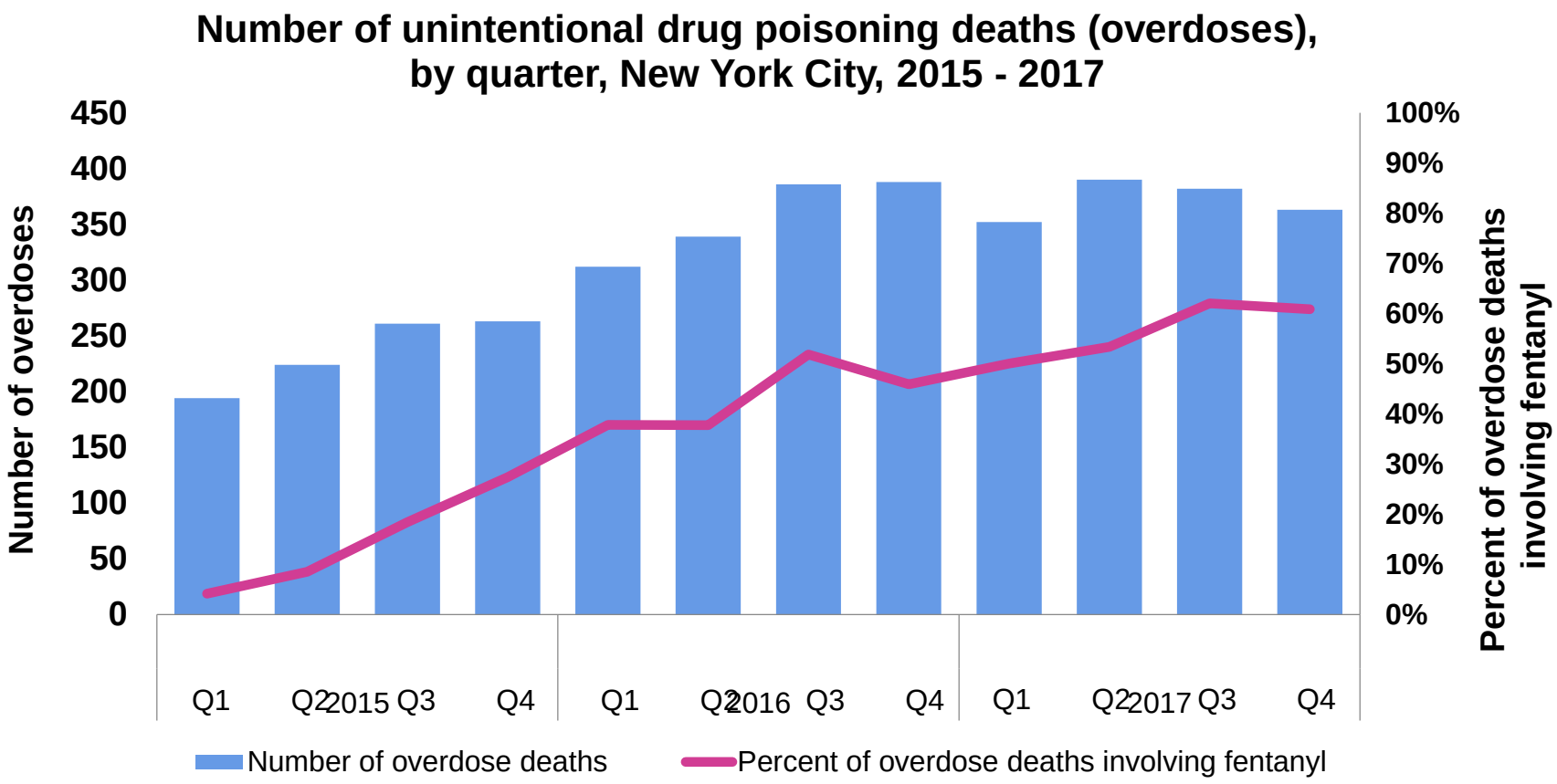
- NYC DOHMH has requested drug product testing to support investigations into increased drug-related morbidity and mortality

- Will discuss two different instances where drug product testing was performed
  - Case 1: Estimating exposure to fentanyl among NYC syringe exchange participants
  - Case 2: Synthetic cannabinoid (K2) product testing during a period of elevated K2-related morbidity

Case Study 1:

Estimating exposure to fentanyl among NYC syringe exchange participants

Fentanyl driving historic numbers of overdose deaths in New York City



*Source: New York City Office of the Chief Medical Examiner & New York City Department of Health and Mental Hygiene, 2015-2017**

*Data for 2017 are provisional and subject to change

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Initiated drug product testing with a clear research question

- The aim was to understand the risk of exposure to fentanyl among syringe exchange program (SEP) participants in NYC
  - Wanted to understand if exposure to fentanyl is common (and a small increase in overdose risk) or if fentanyl exposure is rare, but likely fatal
  - This has implications for risk reduction strategies

Field-based research methods

- We visited 12 SEPs
  - 11 SEPs in final sample: one (1) was not included in analysis because visit did not yield data

- Study participants were given a syringe labeled with a unique ID number, injection supplies, and a round-trip MetroCard

- Study participants returned their used syringe to research staff within scheduled hours

Field-based research methods

- Upon returning the used syringe, participants completed a short survey about the drugs they thought they used and risk reduction strategies

- Participants were given the anonymous ID number associated with their syringe in order to access their test results in the future, as well as a $20 gift card

- Syringes were mailed via FedEx to NMS Laboratory for toxicology testing

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Laboratory-based research methods

- Drug residue from syringes tested using highly sensitive laboratory testing methods
  - Syringes were first tested using gas chromatography mass spectrometry (GC-MS)
  - Syringes were subsequently tested using liquid chromatography time-of-flight mass spectrometry (LC-QTOF)
- We reported the LC-QTOF results
- Fentanyl or fentanyl analogues detected in quantities greater than 10% of the residue mass are reported

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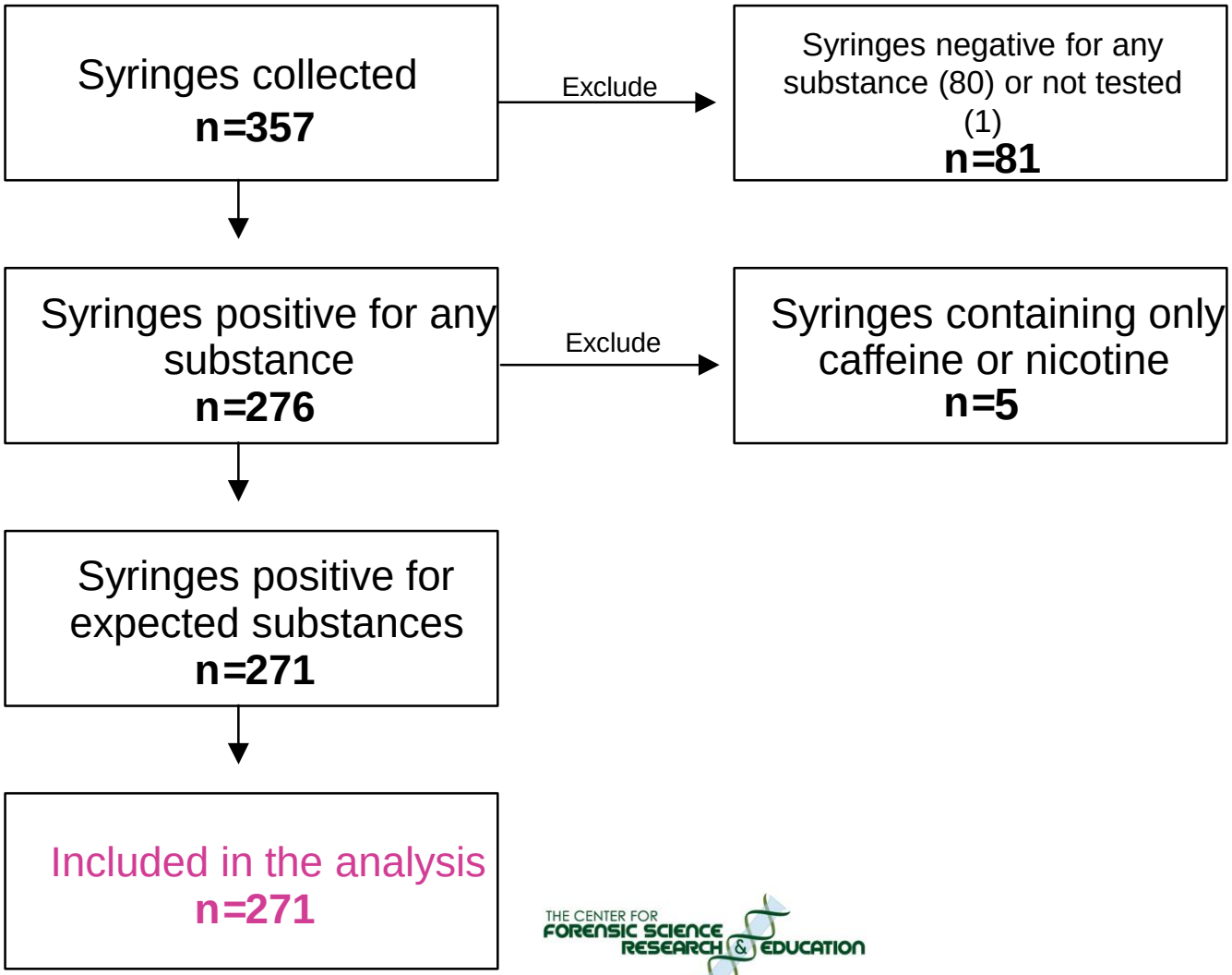
Analytic sample of study participants and syringes



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Drug residue testing results from syringes used by SEP participants

	Number of syringes	Percent
Syringes Submitted for Testing	**N = 357**	**100%**
No compound detected	80	23%
No controlled substance detected	5	1%
Controlled substance detected	271	76%
Syringes Positive For Controlled Substances	**N = 271**	**100%**
Other psychoactive substance detected	225	83%
Fentanyl or fentanyl analogues detected	46	17%
Fentanyl or Fentanyl Analogue*	**N = 46**	**100%**
Fentanyl	36	78%
Furanyl-fentanyl	10	22%
4-Fluoroisobutyryl fentanyl	5	11%

*Sum of values will not equal total as categories are not mutually exclusive

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Summary of results

- Syringes tested positive for fentanyl in all five NYC boroughs
- Exposure to fentanyl was lower than what is seen in mortality data (17% vs. 50%)
- Participants were generally
  - unaware when they had injected fentanyl
  - unable to detect a difference in the subjective feeling of the injection

Study findings informed public health approach

- Exposure to fentanyl relatively common, and not always fatal
- Given the prevalence of fentanyl, interventions focused on avoiding fentanyl may be ineffective
  - Avoiding fentanyl may not be practical nor sustainable as individuals use products containing fentanyl without adverse effects
- Findings support adoption of universal precautions, less reliance on fentanyl test strips

Case Study 2:

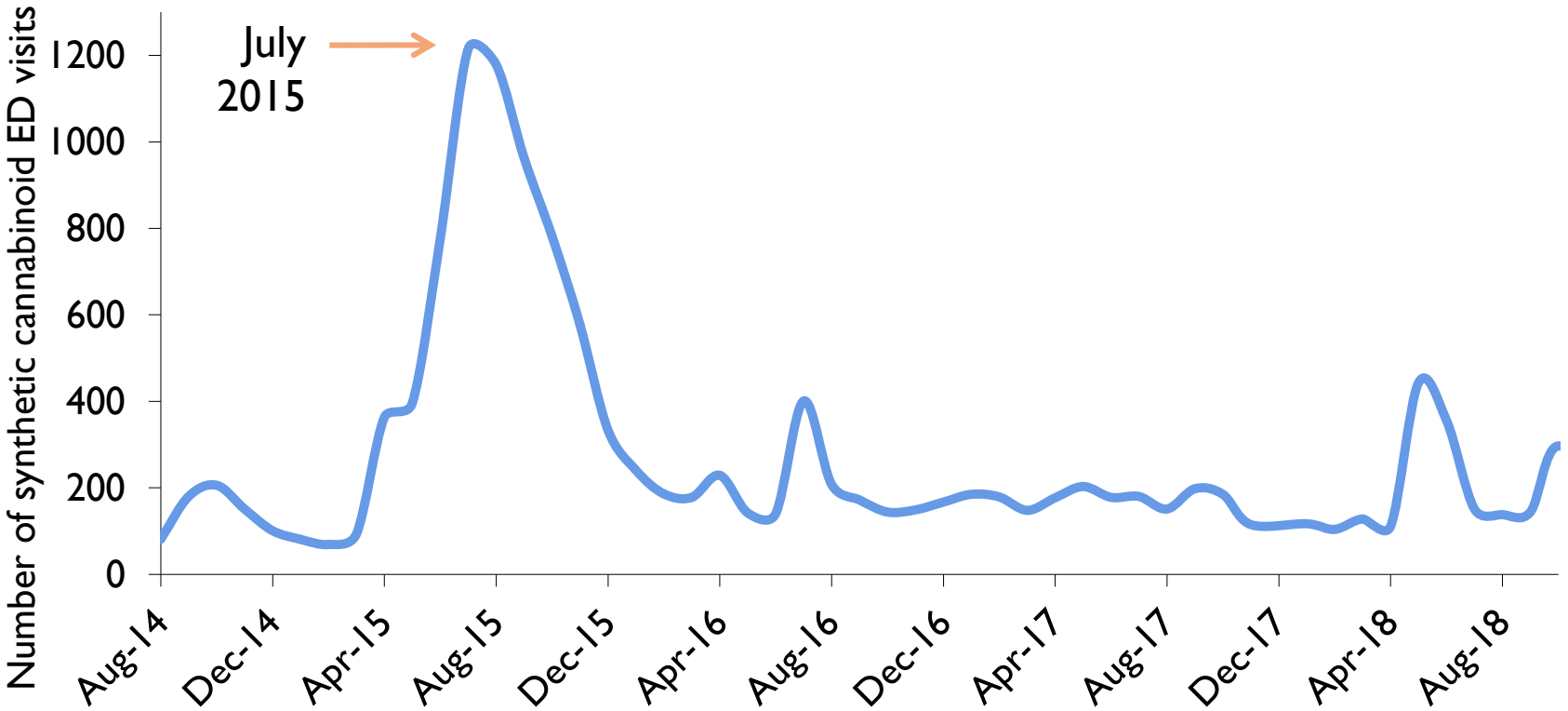
Synthetic cannabinoid (K2) product testing during a period of elevated K2-related morbidity

DOHMH closely monitoring K2-related ED visits

- DOHMH conducts real-time surveillance of drug-related ED visits
- Electronically receives data daily from 54 EDs in NYC
- Syndromic ED data useful to assess trends; should not be interpreted as an exact case count
- Daily monitoring of K2-related ED visits began in 2014
  - Data used to inform public health interventions

New York City has had multiple periods of increased K2-related ED visits

Trends in K2-related emergency department visits, New York City, January 2014 – October 2018



Source: New York City Department of Health and Mental Hygiene, Bureau of Alcohol, Drug Use Prevention, Care and Treatment
Syndromic Surveillance, synthetic cannabinoid syndrome, 01/01/14 - 10/31/18.
Limitations: Syndromic surveillance data based on chief complaint field.
Not all emergency departments report drug involved. Data is incomplete and should be interpreted with caution.

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Several K2 products submitted for testing

- Product testing performed on some products removed from stores by NYPD
- Drug product testing performed for some products found with patients with a K2-related emergency department visit
- Product testing not systematic; no clear question

Findings from testing K2 products removed from stores

- Chemical compounds were not consistent within package brands
- Many packages contained multiple compounds
- At the time, we did not have information on how K2 products were being packaged
  - Subsequently learned that K2 packages and chemicals ordered separately and combined closer to point of sale

Findings from testing K2 products associated with ED visits

- No consistent pattern of chemicals involved in ED visits
- Unable to ascertain if some compounds associated with adverse events
  - Did not have data on prevalence of synthetic cannabinoid compounds circulating in New York City
- No information on product concentration
  - Could not determine if ED visits resulted from a riskier substance, riskier dosage, or increased availability

Findings from K2 product testing

- Ultimately, K2 product testing had limited public health value

- Toxicology results did not change harm reduction messaging, clinical approaches, or public health strategy

Educational materials developed and distributed by DOHMH

- In 2014, DOHMH developed and distributed educational materials to high-risk populations and all city shelters
  - Materials available in both English and Spanish

- From 2014-2016, DOHMH distributed posters and educational materials for people using K2 who were connected with social service and health care providers in the impacted neighborhoods

- From 2015-2016, DOHMH and DCA ran educational campaigns in neighborhoods with the most K2-related ED visits

- From February – April 2018, DOHMH will run a targeted campaign in three neighborhoods with large numbers of K2-related ED visits


Green Gia
Bizarro, G
Geeked U
Smacked
AK-47, Bi
Green Giant, Bizarro
Bizarro, Green Giant,
Geeked Up, Smacked,
Smacked, Bizarro, Gree
AK-47, Biza
Green Gia
Bizarro, G
Geeked U
Smacked
0% MARIJUANA
100% DANGEROUS
K2 is not marijuana. It is a dangerous mix of chemicals that can cause severe anxiety, heart attack, passing out and even death.
For more information call 311 or visit nyc.gov/K2
NYC | Health | Consumer Affairs


0% MARIJUANA
100% DANGEROUS
Take care of yourself.
Take charge of your health.
For free, confidential help with substance use and mental health
CALL 1.800.LIFENET
CALL 1-888-NYC-WELL
NYC | Health | Consumer Affairs

Recommendations

- Know the question(s) you want answered with product testing, before initiating
  - Confirm testing results will help answer those questions
  - Many questions require analysis of a control group or drug market prevalence data, which may not be available
- Consider alternate (less expensive) approaches
  - Law enforcement product seizure data might be another way to estimate prevalence of fentanyl
  - Law enforcement routinely tests drug samples
    - Implementing sharing of drug testing data between law enforcement and health can be critical