Difference in mortality assessment due to the definition of overdose when using death certificate text

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Reducing Drug Overdose Mortality Remains a Public Health Goal

Two decades after the opioid overdose epidemic began, reducing drug overdose mortality remains a goal (SU-03[1]).

Some positive signs: prescription opioid and heroin mortality decreasing[2]

Some negative signs: fentanyl and stimulant mortality increasing[2]

Study Goal: Assess differences in counts of drug-involved death utilizing two different definitions from public health

[1]https://health.gov/healthypeople/objectives-and-data/browse-objectives/drug-and-alcohol-use/reduce-drug-overdose-deaths-su-03

[2]Mattson CL, Tanz LJ, Quinn K, Kariisa M, Patel P, Davis NL. Trends and Geographic Patterns in Drug and Synthetic Opioid Overdose Deaths — United States, 2013–2019. MMWR Morb Mortal Wkly Rep 2021;70:202–207.

Defining Overdose

- Drug overdose is usually defined using underlying cause of death (COD) codes to differentiate from other causes
- The International Classification of Diseases, Tenth Revision (ICD-10) defined underlying cause of death as:
  - "the disease or injury which initiated the train of morbid events leading directly to death or the circumstances of the accident or violence which produced the fatal injury"[3]

[3]Instructions for Classifying the Underlying Cause of Death, 2017. Available from: https://www.cdc.gov/nchs/data/dvs/2a_2017.pdf

Two Different Definitions Examined

The underlying COD is used to define the universe of overdose deaths and dictates the scope of the public health burden.

Definition 1: Poisoning Codes[4]

- X40-44: Unintentional
- X60-64: Suicide
- X85: Homicide
- Y10-14: Undetermined intent

Definition 2: Poisoning + Mental Health Codes[5]

- Poisoning codes plus…
- F10-F19[.0, .1]: Mental health disorders indicating harmful use or dependence syndrome
- Alcohol (X45, X65, Y15)

[4]Mattson CL, Tanz LJ, Quinn K, Kariisa M, Patel P, Davis NL. Trends and Geographic Patterns in Drug and Synthetic Opioid Overdose Deaths — United States, 2013–2019. MMWR Morb Mortal Wkly Rep 2021;70:202–207.

[5]Drug-Related Fatalities Among Vermonters: Vermont Department of Health; 2018 [Available from: https://www.healthvermont.gov/sites/default/files/documents/pdf/ADAP_Data_Brief_Drug_Related_Fatalities.pdf

Using Death Certificates to Identify Drug-Involved Deaths

- The Drug Involved Mortality (DIM) database managed by the CDC contains all drug mentions in death certificates
- Identified deaths where buprenorphine, oxycodone, or hydrocodone were involved
  - Identified a subset of deaths where drug involvement is likely, but not based on underlying COD
  - A mention was considered involved unless contextual evidence indicated otherwise[6]
- Difference in counts between definitions calculated

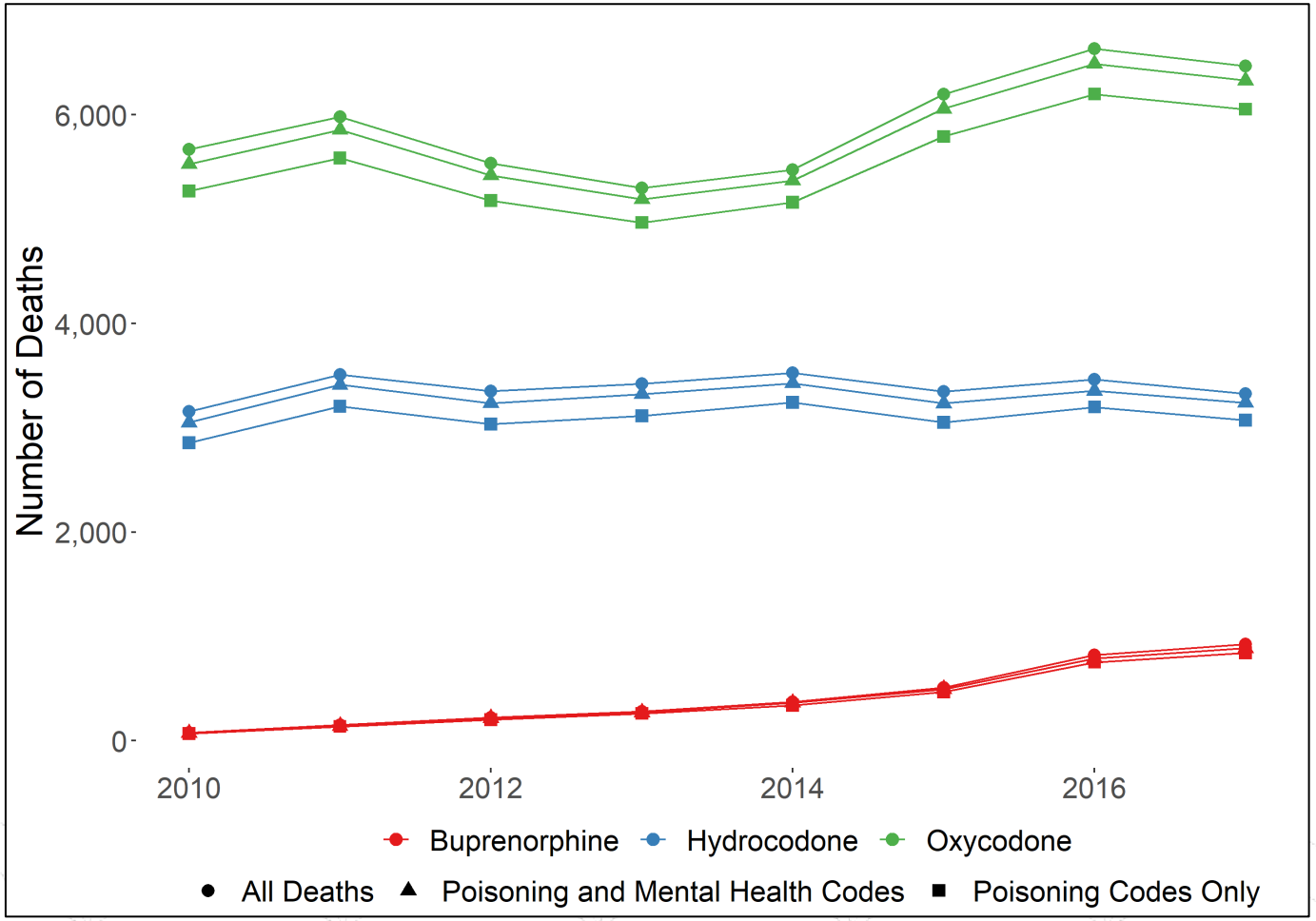
[6]Trinidad JP, Warner M, Bastian BA, Miniño AM, Hedegaard H. Using literal text from the death certificate to enhance mortality statistics: characterizing drug involvement in deaths. National Vital Statistics Report: Centers for Disease Control and Prevention; 2016. p. 15.

Demographics of Sample, DIM, 2010-2017

	Buprenorphine	Hydrocodone	Oxycodone
Sex			
Female, N (%)	1,155 (35.6%)	12,760 (48.6%)	19,679 (42.6%)
Male, N (%)	2,086 (64.4%)	13,518 (51.4%)	26,565 (57.4%)
Age, median (IQR)	38 (30, 49)	48 (38, 56)	45 (35, 54)
NCHS Bridged Race			
Asian or Pacific Islander	27 (0.8%)	204 (0.8%)	328 (0.7%)
Black	129 (4.0%)	1,532 (5.8%)	2,751 (5.9%)
Native American or Alaskan Native	26 (0.8%)	350 (1.3%)	560 (1.2%)
White	3,059 (94.4%)	24,192 (92.1%)	42,605 (92.1%)

Demographics generally are similar across drug groups, though decedents with buprenorphine involved were younger, higher White percentage, lower Black percentage, and higher male percentage.

Number of Deaths, DIM, 2010-2017

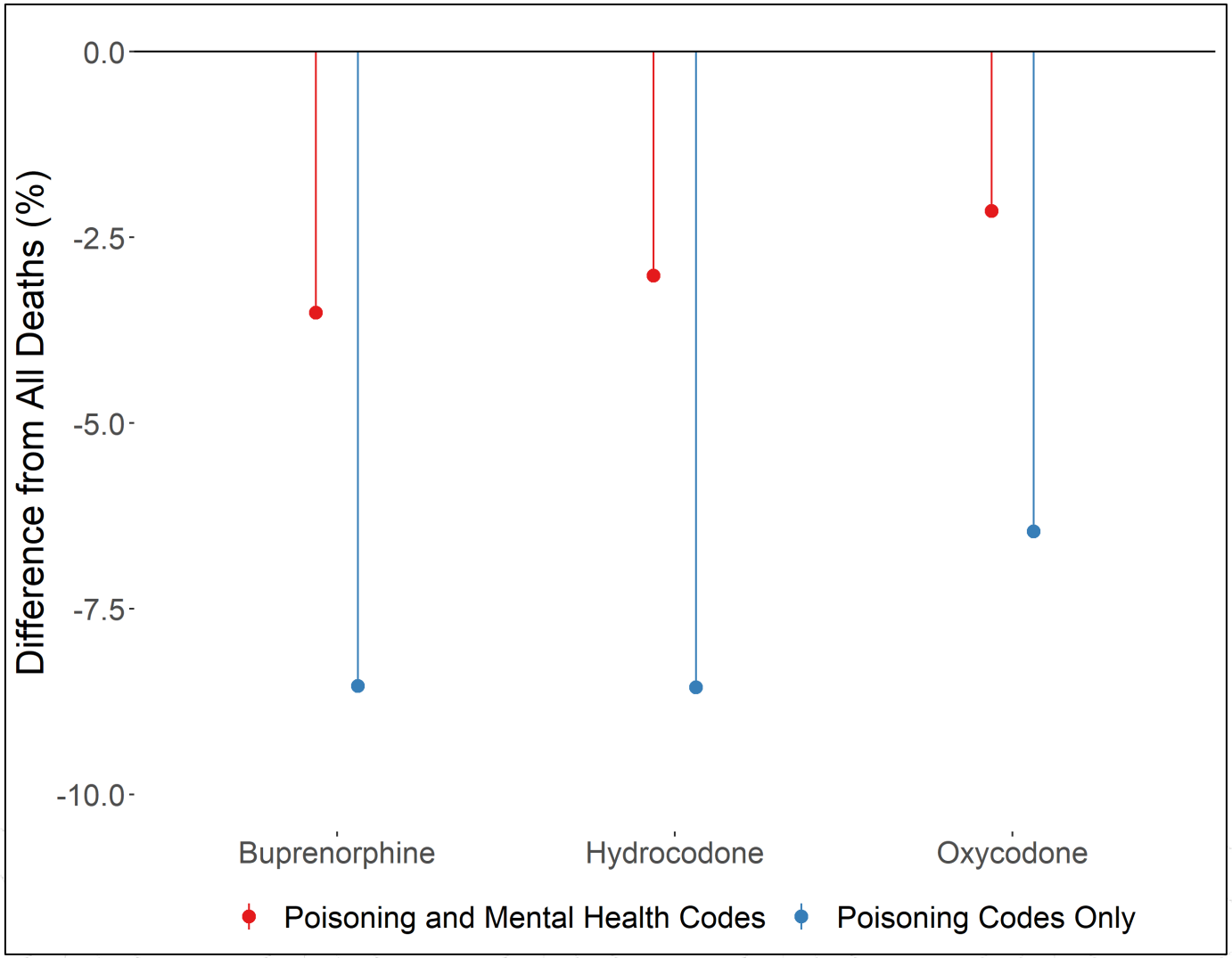


Total number of deaths mentioning oxycodone was increasing, and buprenorphine was increasing over the study period.

The difference between definitions was mostly constant over time for hydrocodone and oxycodone.

Difference between definitions for buprenorphine was increasing across study period.

Difference between Definitions, Cumulative



Including poisoning, mental health, and alcohol poisoning underlying COD codes excluded:

- 118 buprenorphine-involved deaths (~15 per year)
- 817 hydrocodone-involved deaths (~102 per year)
- 1,013 oxycodone-involved deaths (~127 per year)

Including only poisoning underlying COD codes excluded:

- 287 buprenorphine-involved deaths (~36 per year)
- 2,320 hydrocodone-involved deaths (~290 per year)
- 3,054 oxycodone-involved deaths (~382 per year)

Strengths and Limitations

Strengths

- DIM is comprehensive of all deaths in the US
- Standardized process for identifying drug-involved mentions at federal level

Limitations

- Substance flagged as not involved only if text indicated it wasn't
- Standards for listing drugs on death certificates changed over time

Conclusions

- A notable difference between overdose definitions was observed among drug-involved deaths (2.14%-8.56%)
- Extrapolation of the undercount to deaths without a drug mention is unclear
- Failing to include deaths related to harmful substance use or dependence undercounts drug-involved mortality
  - Diverging trend in buprenorphine-involved death could indicate a growing, unrecognized opioid-related mortality trend
- Reinforces importance of death certificate text to understanding different types of drug-involved mortality

Thank you!

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