Leveraging Literal Text on North Carolina Death Certificates to Enhance Understanding of Polydrug Involvement in Overdose Deaths, 2015-2019

Kristin Y. Shiue[1,2], Anna E. Austin[1,2], Scott Proescholdbell[3], Mary E. Cox[3], Michelle Aurelius[4], Rebecca B. Naumann[1,2]

[1]Gillings School of Global Public Health, University of North Carolina at Chapel Hill; [2]Injury Prevention Research Center, University of North Carolina at Chapel Hill;
[3]North Carolina Division of Public Health, Chronic Disease and Injury Section, Injury and Violence Prevention Branch; [4]North Carolina Division of Public Health, Office of the Chief Medical Examiner

Background

- Opioid overdose deaths continue to increase in North Carolina (NC), with surveillance indicating a rise in the involvement of other substances at the time of death.
- Existing research on polysubstance use has largely relied on broad substance categorizations captured by ICD-10 codes on death certificates, with limited consideration of the literal text.
- Literal cause-of-death text offers richer information on specific drug involvement that can enhance mortality investigations.

Purpose

To utilize literal text on death certificates to conduct an in-depth examination of temporal trends in the specific types and combinations of drugs involved in NC overdose deaths from 2015-2019.

Methods

- Used 2015-2019 NC State Center for Health Statistics Vital Records death certificate data for NC residents to identify all decedents with a drug poisoning as the underlying cause of death: ICD-10 codes X40-X44, X60-X64, X85, Y10-Y14.
- Literal text from three death certificate fields (causes of death, significant conditions contributing to death, description of how injury occurred) were searched for drug mentions by integrating a tool developed by the Council of State & Territorial Epidemiologists Overdose Subcommittee with search terms developed through a CDC/FDA collaboration.
- Polydrug overdose deaths were defined as those involving two or more unique specific drugs, per the literal text drug mentions (e.g., fentanyl, heroin).

Acknowledgements

Funding: This work was supported by an award from the National Center for Injury Prevention and Control in the CDC) to the North Carolina Division of Public Health (Overdose Data to Action, cooperative agreement #5NU17CE925024-02-00); authors from the University of North Carolina at Chapel Hill were funded through a subcontract under this grant (contract # 5118396).

For more information: Kristin Shiue; kshiue@unc.edu

Results

Figure 1. Polydrug Involvement in NC Overdose Deaths, 2015-2019

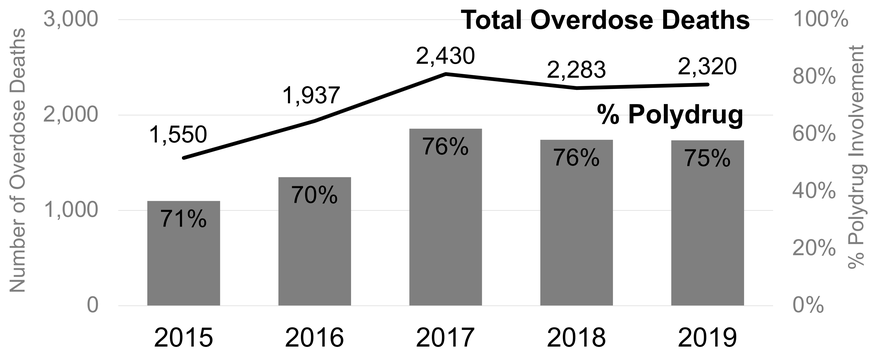


Table 1. Top 10 Drugs Involved in NC Overdose Deaths, 2015-2019

	2015 n=1,550	2016 n=1,937	2017 n=2,340	2018 n=2,283	2019 n=2,320
1	Heroin	Heroin	Fentanyl	Fentanyl	Fentanyl
2	Oxycodone	Fentanyl	Cocaine	Cocaine	Cocaine
3	Cocaine	Cocaine	Heroin	Heroin	Heroin
4	Alprazolam	Alprazolam	Alprazolam	Alcohol	Alcohol
5	Fentanyl	Oxycodone	Alcohol	Alprazolam	Methamphet.
6	Alcohol	Alcohol	Oxycodone	Gabapentin	Alprazolam
7	Gabapentin	Gabapentin	Gabapentin	Oxycodone	Gabapentin
8	Hydrocodone	Clonazepam	Clonazepam	Methamphet.	Oxycodone
9	Oxymorphone	Hydrocodone	Methamphet.	Clonazepam	Clonazepam
10	Methadone	Methadone	Morphine	Diazepam	Diazepam

Table 2. Concomitant Drugs Involved in NC Overdose Deaths, 2019

Drug	Deaths with Involvement	Concomitant Drug 1§	Concomitant Drug 2§	Concomitant Drug 3§
Fentanyl	1,344	Cocaine 38%	Heroin 31%	Alcohol 17%
Cocaine	804	Fentanyl 64%	Heroin 28%	Alcohol 18%
Heroin	613	Fentanyl 69%	Cocaine 36%	Alcohol 17%
Alcohol	367	Fentanyl 63%	Cocaine 40%	Heroin 28%
Methamphetamine	318	Fentanyl 56%	Heroin 31%	Cocaine 18%

§Row percentages are not mutually exclusive.

Focusing on polydrug combinations in 2019:

- 38% of fentanyl overdose deaths also involved cocaine, 31% also involved heroin, and 17% also involved alcohol (Table 2).
- Among the remaining top 10 drugs in 2019, fentanyl was consistently the most common concomitant drug involved in overdose deaths.
- The most common combinations were fentanyl + cocaine, fentanyl + heroin, and fentanyl + cocaine + heroin (Figure 3).

- The percentage of overdose deaths involving multiple drugs increased from 2015 to 2019 (Figure 1).
- In 2019, 75% of overdose deaths had polydrug involvement, with an average of 2.4 (range: 0 to 9) drug mentions in the literal text.
- From 2015 to 2019, there was a steep increase in the percentage of overdose deaths involving fentanyl (15% to 58%; Figure 2).
- During the same time period, there were notable increases in the involvement of cocaine (21% to 35%) and methamphetamine (3% to 14%), with a shift away from commonly prescribed opioids (oxycodone, hydrocodone, methadone; Table 1).
- Alcohol and gabapentin involvement remained relatively stable.

Figure 2. Top 10 Drugs Involved in NC Overdose Deaths, 2015 vs. 2019

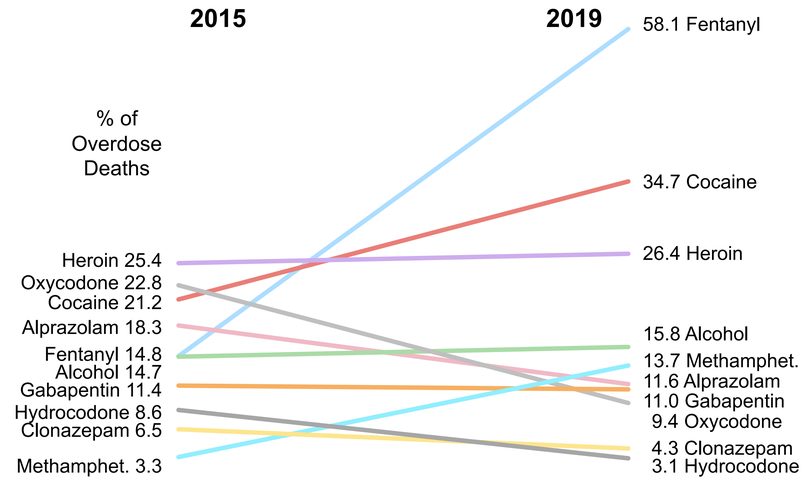
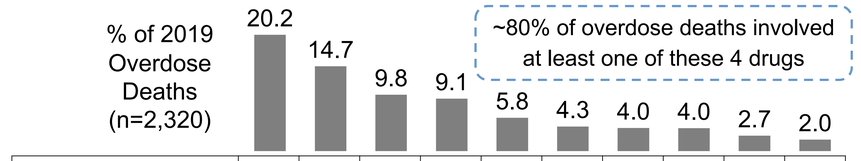


Figure 3. Drug Combinations Involved in NC Overdose Deaths, 2019†



Fentanyl	x	x	x		x			x		x
Cocaine		x		x	x				x	
Heroin			x		x		x		x	x
Methamphetamine						x		x		x

†Combinations shown are mutually exclusive, though in some instances involved other drugs (e.g., fentanyl + alcohol categorized in first column).

Conclusions

Literal text analysis of NC death certificates identified temporal trends in the specific drugs and combinations most frequently involved in overdose deaths. These methods are an important component of ongoing overdose surveillance, as literal text provides an increased level of detail that can better inform effective polydrug use and overdose prevention approaches.