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Research Report

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The Synthetic Opioid Surge in the United States

Insights from Mortality and Seizure Data

The drug overdose crisis in the United States was initiated by prescription opioids nearly two decades ago (Kolodny et al., 2015). Since 2014, increases in overdose deaths have been driven largely by exposure to potent synthetic opioids, such as fentanyl, its analogs, or other novel synthetic opioids.[1] In 2017, there were more than 70,000 drug-involved overdoses, of which some 47,000 involved opioids (Scholl et al., 2019). Synthetic opioids, principally fentanyl (Hedegaard et al., 2018), were reported in more than 31,000 fatal overdoses, or two-thirds of all opioid-involved deaths, in 2018 (Ahmad et al., 2019). Starting in late 2013, illicitly manufactured synthetic opioids entered some markets as adulterants in heroin; they were also pressed into counterfeit tablets and sold on the street as prescription medications (Drug Enforcement Administration [DEA], 2018; Gladden, Martinez, and Seth, 2016).

In less than six years, the number of fatal overdoses involving synthetic opioids in the United States has risen tenfold, surpassing drug overdoses for heroin or prescription opioids by a factor of two. Perhaps even more troubling is the possible diffusion of synthetic opioids into nonopioid markets (DEA, 2018; Jones, Einstein, and Compton, 2018). Cause of death data analyzed in this report show that in 2017 more than half of cocaine and one-quarter of psychostimulant overdose deaths also mentioned synthetic opioids.[2]

KEY FINDINGS

- Through 2017, seizures of fentanyl and overdose deaths involving synthetic opioids were geographically concentrated, with parts of Appalachia and New England most severely affected. Given the concentration of exposure, there is a worrying possibility that fentanyl and other synthetic opioids will become entrenched in other drug markets, especially in the western United States.
- Although synthetic opioid overdoses are rising in Ohio and New Hampshire, there has been a simultaneous decline in these states in the absolute number of fatal overdoses and seizures involving heroin, possibly suggesting that fentanyl and other synthetic opioids are replacing and not just adulterating heroin. In the states that have been exposed to fentanyl and synthetic opioids the longest, there is a continued upward trend in the number of fatal synthetic opioid overdoses that do not include heroin or cocaine.
- Nationally, half of cocaine overdose deaths also include mention of synthetic opioids. The reasons behind this relationship are unclear, but people who use cocaine are increasingly at risk of fatal overdose because of increasing contact with synthetic opioids. There is also a rising trend in psychostimulant (specifically methamphetamine) overdoses that also involve synthetic opioids.

National trends in fatal drug overdoses containing synthetic opioids have been documented by recent research (e.g., Jones, Einstein, and Compton, 2018; Scholl et al., 2019). Scholl et al., 2019, notes that between 2013 and 2017, fatal overdoses involving synthetic opioids increased significantly in 15 of 20 states analyzed, while overdoses involving prescription pain relievers or heroin started to plateau. Jones, Einstein, and Compton, 2018, shows the rise in drug overdose death certificates recording synthetic opioids across various drug categories, such as cocaine, benzodiazepines, and psychostimulants, suggesting that nonopioid users are increasingly exposed to potent synthetic opioids.

In this report, we first examine mortality data at the state level across several drug classes to better understand the evolution and concentration of overdose fatalities in the United States. This is followed by an examination of drug seizures of fentanyl and fentanyl analogs across states and over time to determine the overlap between supply-side indicators and state-level mortality data. We report three main findings:

- First, overdose deaths involving synthetic opioids and certain supply-side indicators of synthetic opioids have increased over time but remain concentrated in certain states; the same is true for total drug overdose deaths in counties within affected states.
- Second, there have been sharp increases in the share of heroin or cocaine overdoses that mention synthetic opioids; furthermore, there appears to have been an absolute decline in fatal overdoses involving heroin without synthetic opioids in a few states. State-level analysis of drug seizures for heroin and fentanyl also show an inverse relationship since about 2014, which suggests that some markets may be transitioning toward potent synthetic opioids being the primary drug, not just an adulterant of another drug.
- Third, a substantial share of cocaine overdoses also mention synthetic opioids, suggesting that people who use cocaine are increasingly exposed to synthetic opioids and are at high risk of overdose.[3]

Methods

Mortality data are available from the Centers for Disease Control and Prevention's (CDC's) National Vital Statistics System. Data for 2005 to 2017 were provided to RAND under a data use agreement with the CDC and contain individual death certificate records on the decedent's county of residence and information on relevant International Statistical Classification of Diseases and Related Health Problems (ICD-10) codes for drug poisonings. To examine state and county trends, we extracted drug overdose deaths with the underlying cause of death codes unintentional (X40–X44), suicide (X60–X64), homicide (X85), and undetermined (Y10–Y14), and the following multiple cause of death T-codes by drug or drug class: heroin, T40.1; natural and semisynthetic opioids (generally considered to be prescription opioids), T40.2; methadone, T40.3; synthetic opioids other than methadone, T40.4; cocaine, T40.5; and unknown/unspecified drug, T50.9. In the state-level analyses, we have suppressed years with fewer than ten deaths from data visualizations.

For county-level analyses, we have suppressed death counts for counties with fewer than 20 overdose deaths, given that death rates based on small counts are considered unreliable (Xu et al., 2018). *County-level* opioid and synthetic opioid overdose death rates are not included in this report because the CDC does not recommend using drug-specific data at the county level because of the unreliability of data from certain counties. Thus, consistent with CDC recommendations, we provide the county-level analysis of all drug overdose deaths because we believe that the evidence of clustering among exposed counties within regions of a state is useful and susceptible to less error than a focus on any singular county, and we know from our examination of the data that these clustering trends are consistent with what is observed in counties that report specifics on opioid mortality. We received institutional review board approval to work with these data from RAND's Human Subjects Protection Committee.

Summary counts of overdoses across drug categories are not mutually exclusive. For example, an individual who consumed heroin tainted with fentanyl would show up in counts involving heroin

as well as synthetic opioids. Therefore, analyses that examine only total counts by drug often ignore the share of overdoses that involve other substances. Because we have access to individual death records, we can calculate the share of overdose deaths by time and place that mention synthetic opioids alone and in combination with other drug categories.

The CDC's National Center for Health Statistics, in collaboration with the U.S. Census Bureau, reports annual population estimates by counties via the Bridged-Race Resident Population Estimates online tool (CDC, 2018). Using this tool, we obtained county and state population estimates to calculate unadjusted or crude overdose death rates. Spencer et al., 2019, notes that the crude and age-adjusted rates of overdose deaths involving fentanyl between 2011 and 2016 were similar.

Some overdose death cases do not list a specific drug. Nationally, the proportion of overdose deaths not listing a specific drug declined from 22 percent to 12 percent between 2013 and 2017. However, several states that have been severely affected by fatal drug overdoses moved in the opposite direction and have reported sharp rises in the number of deaths categorized as unspecified or unknown. That suggests that there may be undercounting of overdoses caused by synthetic opioids or other drugs (Ruhm, 2018), perhaps because medical examiners were simply overwhelmed by the increased workload or lacked resources, including up-to-date reference material, to accurately determine the underlying cause of death.[4]

Given the potential measurement error in drug death reporting, we have restricted our state-level analysis to states (and the District of Columbia) that, according to Scholl et al., 2019, have "very good to excellent" overdose reporting in recent years (see Table 1). These include Ohio, West Virginia, and states in New England.

Because of the possibility of measurement error in overdose mortality data, we also analyze a supply-side indicator: drug seizures for fentanyl and fentanyl analogs. In particular, we examine per capita rates of exhibit counts entered into the National Forensic Laboratory Information System (NFLIS)

There have been sharp increases in the share of heroin or cocaine overdoses that mention synthetic opioids; furthermore, there appears to have been an absolute decline in fatal overdoses involving heroin without synthetic opioids in a few states.

between 2014 and 2017. Seizure counts have their own set of limitations (Reuter, 2001). Seizures are not representative samples of drug market transactions, and these data are aggregate counts by state and year of instances in which a chemical is detected. They are not records of individual seizures, so we are unable to adjust for purity, drug mixtures (e.g., heroin containing fentanyl), location, and where in the supply chain the seizure occurred (e.g., wholesale versus retail).

Because of the limitations in both mortality and seizure data, it is unclear how much one can trust either data set individually. However, the limitations in these two very different sources of data would seem to be largely unrelated. Thus, when both series signal similar market trends, that could be seen as stronger evidence for that trend than if the trend manifests in just one data set or the other.

TABLE 1
Overdose Reporting Quality by State in 2017

Overdose Reporting Quality	State
Very good to excellent	Alaska, Connecticut, District of Columbia,[a] Georgia,[b] Hawaii,[a] Illinois,[b] Iowa, Maine, Maryland, Massachusetts, Nevada, New Hampshire, New Mexico, New York, North Carolina, Ohio,[b] Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee,[b] Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin
Good	Arizona,[a] California,[a] Colorado, Kentucky,[a] Michigan,[a] Minnesota, Missouri, Texas[a]
Fair	Alabama, Arkansas, Delaware, Florida, Idaho, Indiana, Kansas, Louisiana, Mississippi, Montana, North Dakota, Nebraska, New Jersey, Pennsylvania, South Dakota, Wyoming

SOURCE: Scholl et al., 2019.

[a] Denotes "fair" reporting in 2014 for states that the CDC did not consider to be fair in 2017.

[b] Denotes "good" reporting in 2014 for states that the CDC did not consider to be good in 2017.

Findings

Among States with Very Good to Excellent Overdose Reporting, Synthetic Opioid Overdoses Remain Spatially Concentrated

Examining synthetic opioid overdose deaths by state over time shows that fatalities remain fairly concentrated spatially. Figure 1 displays the death rate in 2014 and 2017 by state, revealing an east-west divide. Others have noted this geographic variation (Scholl et al., 2019), in which states east of the Mississippi River report higher rates of overdoses involving synthetic opioids. The low synthetic opioid overdose death rates reported in the west, even for the 15 states west of the Mississippi River with good or fair reporting, mirrors other indicators, such as drug seizure data reported by state and local law enforcement. The correlation between drug seizure exhibits and overdose deaths that mention synthetic opioids supports this east-west variation (DEA, 2018).

Although overdose fatalities are concentrated, they are far from uniform across the eastern United States. We are somewhat limited, however, given that several populous states in the east, including Florida and Pennsylvania, have only fair reporting; synthetic opioid overdose deaths may be undercounted. Nevertheless, several parts of Appalachia and New England stand out for having the largest increases in overdose death rates for synthetic opioids. For example, Ohio and West Virginia report a sixfold jump between 2014 and 2017.

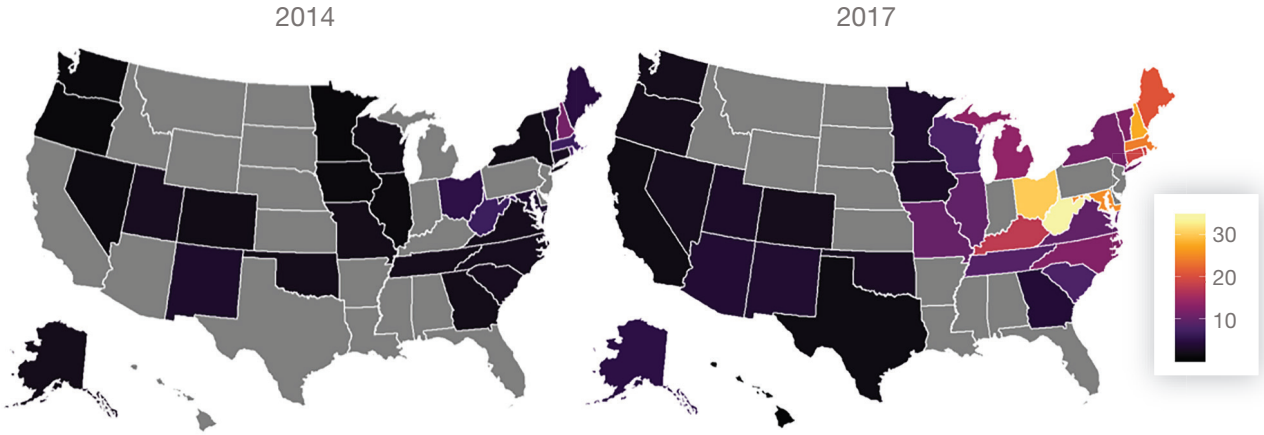
The jurisdictions with the highest synthetic opioid death rates in 2017 are, in order, West Virginia (34.0 per 100,000 people), Ohio (30.2), New Hampshire (27.8), the District of Columbia (26.2), Maryland (25.5), Massachusetts (24.0), Maine (20.8), Connecticut (19.1), and Rhode Island (19.0).[5] Despite having about 10 percent of the country's population, the top nine jurisdictions accounted for nearly one-third of the 28,500 fatal overdoses involving synthetic opioids in 2017. Ohio's share alone was almost 12.5 percent of overdose deaths, even though it has less than 4 percent of the country's population. Ohio's extremely high overdose count may be partly due to the presence of synthetic opioids that are substantially more potent than fentanyl, such as carfentanil, which was reported frequently in drug overdose death and seizure data in that state in recent years (O'Donnell et al., 2018; Pardo, Davis, and Moore, forthcoming).

Supply-Side Indicators Across States Show Similar East-West Divide

NFLIS seizure counts of fentanyl and fentanyl analogs are spatially concentrated in the eastern half of the country. This concentration may not reflect just the actual variation in fentanyl among states. For example, it may also reflect the distribution of law enforcement efforts. Areas acutely affected may invest more in drug law enforcement and thus collect and analyze more seizures. In addition, state and local laboratories may vary in terms of their capacity to analyze seizures.

FIGURE 1

Synthetic Opioid Overdose Death Rate per 100,000 People by State, 2014 and 2017



NOTE: States in gray have only fair overdose reporting.

However, the seizure data trends broadly match the overdose data trends described earlier. In particular, parts of New England and Appalachia have the highest number of counts containing fentanyl or fentanyl analogs. Furthermore, New Hampshire and Ohio report the earliest exposure to fentanyl and fentanyl analogs. As early as 2015, NFLIS data show that fentanyl counts were growing in those two states. By 2017, Ohio reported almost 190 counts per 100,000 inhabitants and New Hampshire nearly 155 counts per 100,000, compared with a nationwide average of 25 counts per 100,000. Figure 2 shows the per capita rate of fentanyl and fentanyl analog counts by state over time.

Overall, we find considerable overlap in the broad temporal and spatial trends for synthetic opioid overdoses and seizures. This overlap suggests that although data limitations may challenge specific comparisons concerning parts of jurisdictions based on a single data source, the general patterns seen in both types of data are less likely to be mere artifacts of data collection anomalies.

Variation in Exposure Within States

Examining overdose deaths at the county level for several states with good to excellent reporting and high synthetic opioid overdose rates shows that all fatal drug overdoses are geographically concentrated within states. Over time, overdose deaths diffused from the southwest and northeast corners of Ohio. In West Virginia, overdoses are concentrated in the south but diffuse to neighboring counties. Figures 3 and 4 show county death rates for these hot spots in Appalachia and New England, respectively, for 2014 through 2017.[6]

The national overdose death rate in 2017, for all drugs, was about 22 deaths per 100,000 inhabitants. Figure 3 shows that the overdose death rates in counties in Ohio ranged from 0.73 to 4.5 times

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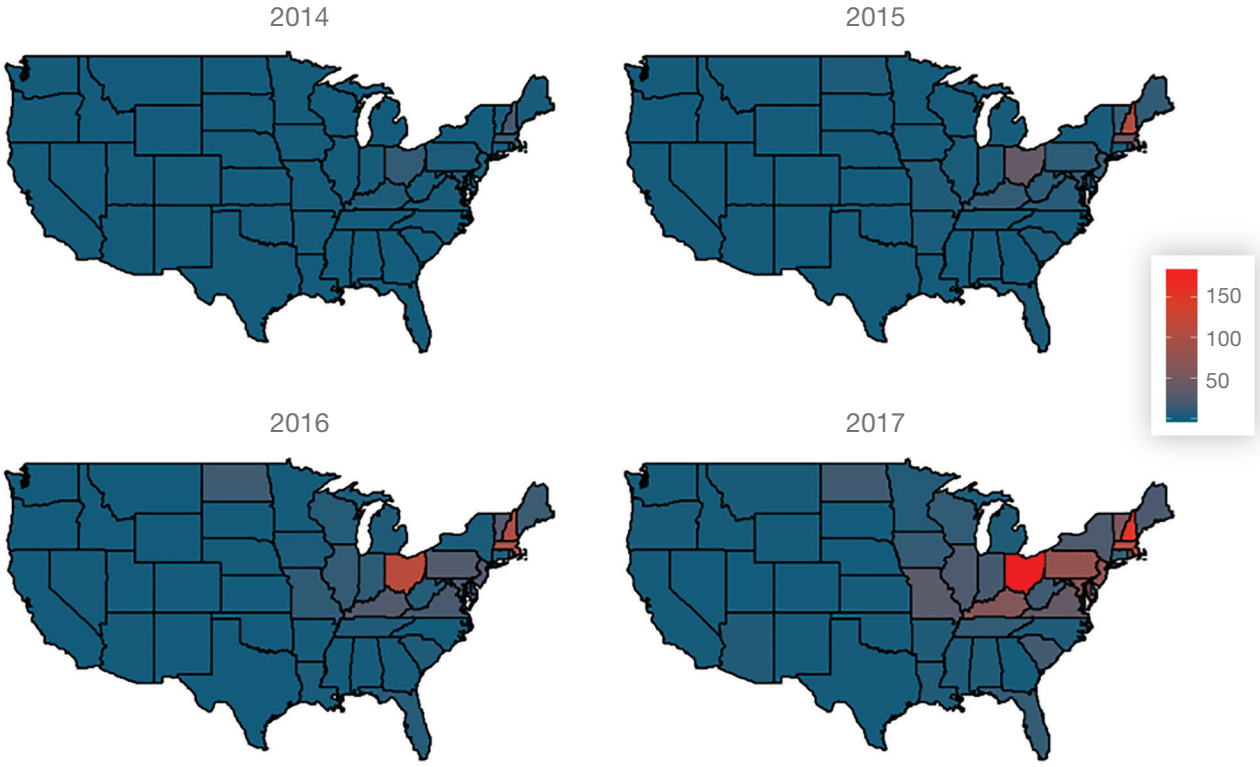
FIGURE 2

Fentanyl and Fentanyl Analog Seizure Counts per 100,000 Inhabitants



the national average. In West Virginia, rates in 2017 ranged from 1.3 to 6.9 times the national average. In New England, drug overdose fatalities first appeared on the coast, near the Boston metro region. Over time, overdoses spread to neighboring counties. Figure 4 shows that the drug overdose death rates in counties ranged from 0.82 to 2.2 times the national average in 2017. Focusing on deaths for just synthetic opioids would show higher overdose death rates compared with the national average of nine deaths per 100,000 people but a similar regional pattern.

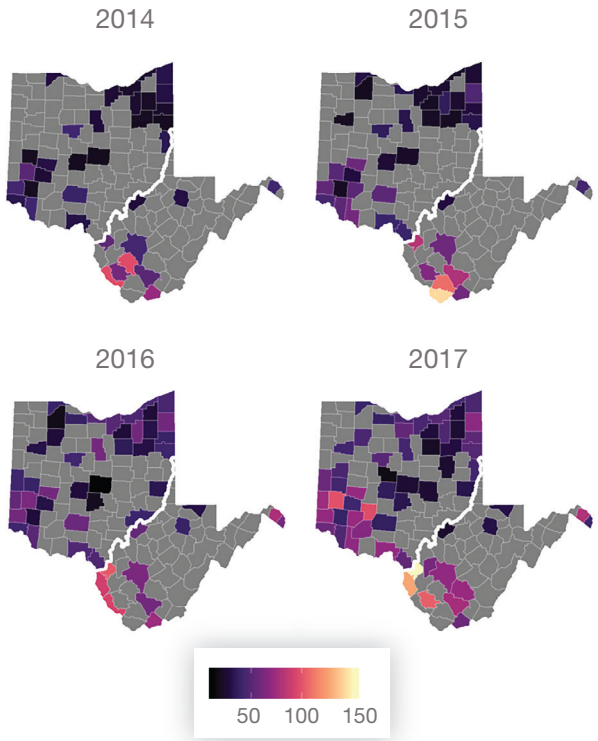
Although we show all drug overdose deaths, the majority of these were caused by opioids, particularly synthetic opioids in the later years. An examination of figures for synthetic opioids alone (in those counties that report) shows nearly identical clusters within the states. Thus, we interpret these figures as showing that synthetic opioids diffuse rapidly in nearby areas and are sustained over time. Counties that reported overdose fatalities earlier in the series remain acutely affected by 2017; several counties report jumps in death rates by more than an order of magnitude. A further examination of overdose deaths that involve multiple drugs provides additional insights into the risks faced by those who use street drugs, such as cocaine and heroin.

Diffusion of Synthetic Opioids Across Drug Classes and Declining Heroin Markets

Synthetic opioids have entered some heroin markets along the East Coast as adulterants and may now be supplanting traditional street drugs. Among states with the highest synthetic opioid death rates, the number of heroin overdoses is declining even as the number of synthetic-only deaths (i.e., those that exclude mention of heroin, cocaine, psychostimulants, or prescription opioids but could include other drugs or alcohol) continues to rise. If synthetic opioids were merely used as an adulterant, then we would expect to see increasing, not decreasing, heroin overdoses.

FIGURE 3

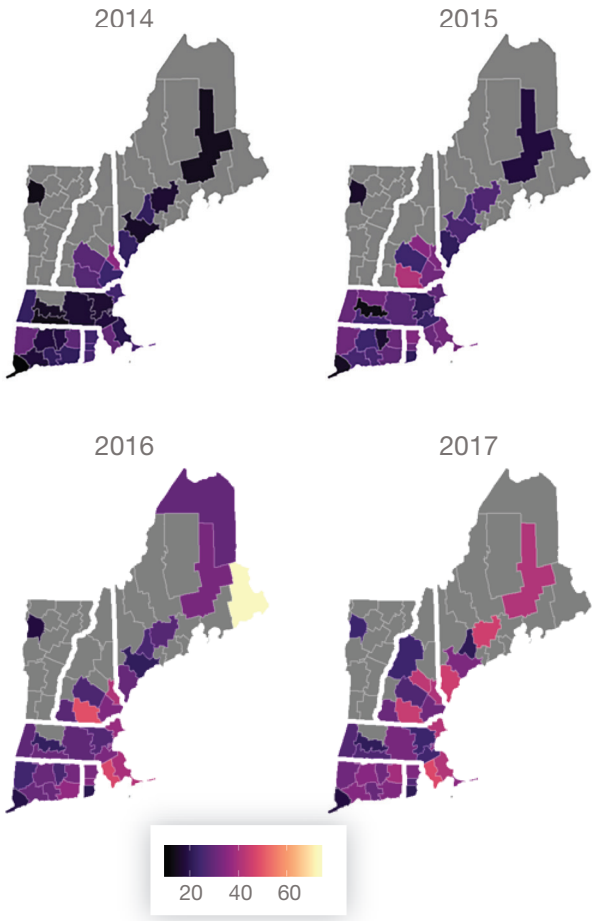
Overdose Death Rate per 100,000 People for All Drugs by County in Ohio and West Virginia, 2014 to 2017



NOTE: Jurisdictions with fewer than 20 deaths are shown in gray.

FIGURE 4

Overdose Death Rate per 100,000 People for All Drugs by County in New England, 2014 to 2017



NOTE: Jurisdictions with fewer than 20 deaths are shown in gray.

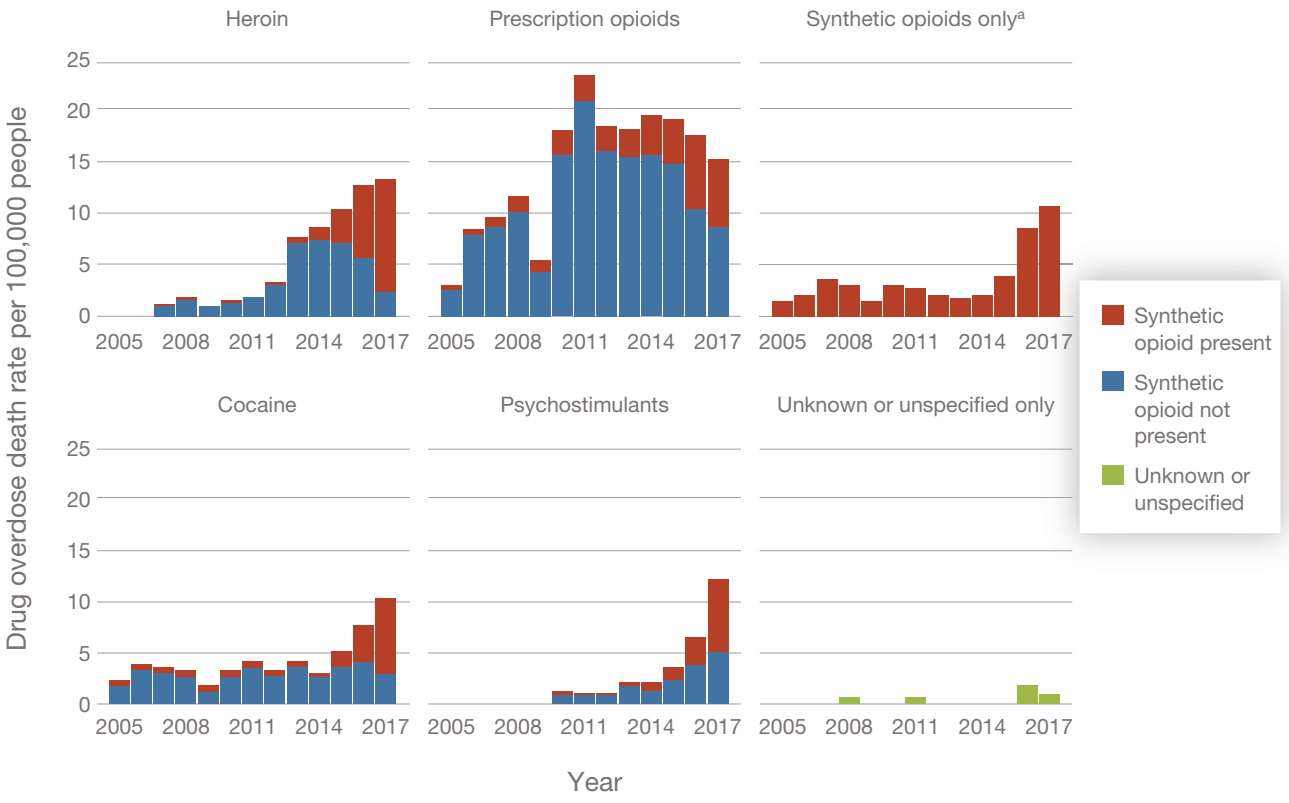
West Virginia, which continues to suffer from high rates of prescription opioid misuse and overdose, had the highest synthetic opioid overdose death rate in 2017.

Figures 5, 6, and 7 show overdoses for several drug categories over time in West Virginia, Ohio, and New Hampshire, respectively. Those three states had the highest rates of overdoses involving synthetic opioids in 2017; Scholl et al., 2019, describes them as having good to excellent overdose data reporting; and they illustrate the variety of ways fentanyl may affect drug markets. It is unclear from these data alone whether users are aware that they are consuming synthetic opioids or just believe they are consuming a purer form of heroin (Carroll et al., 2017; Ciccarone, Ondocsin, and Mars, 2017).

West Virginia, which continues to suffer from high rates of prescription opioid misuse and overdose, had the highest synthetic opioid overdose death rate in 2017. The trend toward synthetic opioids started in 2014 with an increasing number of heroin deaths. The diffusion of deaths involving synthetic opioids continued in the following years across

FIGURE 5

Drug Overdose Death Rate per 100,000 People in West Virginia



NOTES: Years without bars are caused by suppression. Yearly death counts fewer than ten have been omitted from this analysis. Therefore, years without any bars may not be true zeros.

[a] Excludes cocaine, heroin, prescription opioid, and psychostimulant deaths.

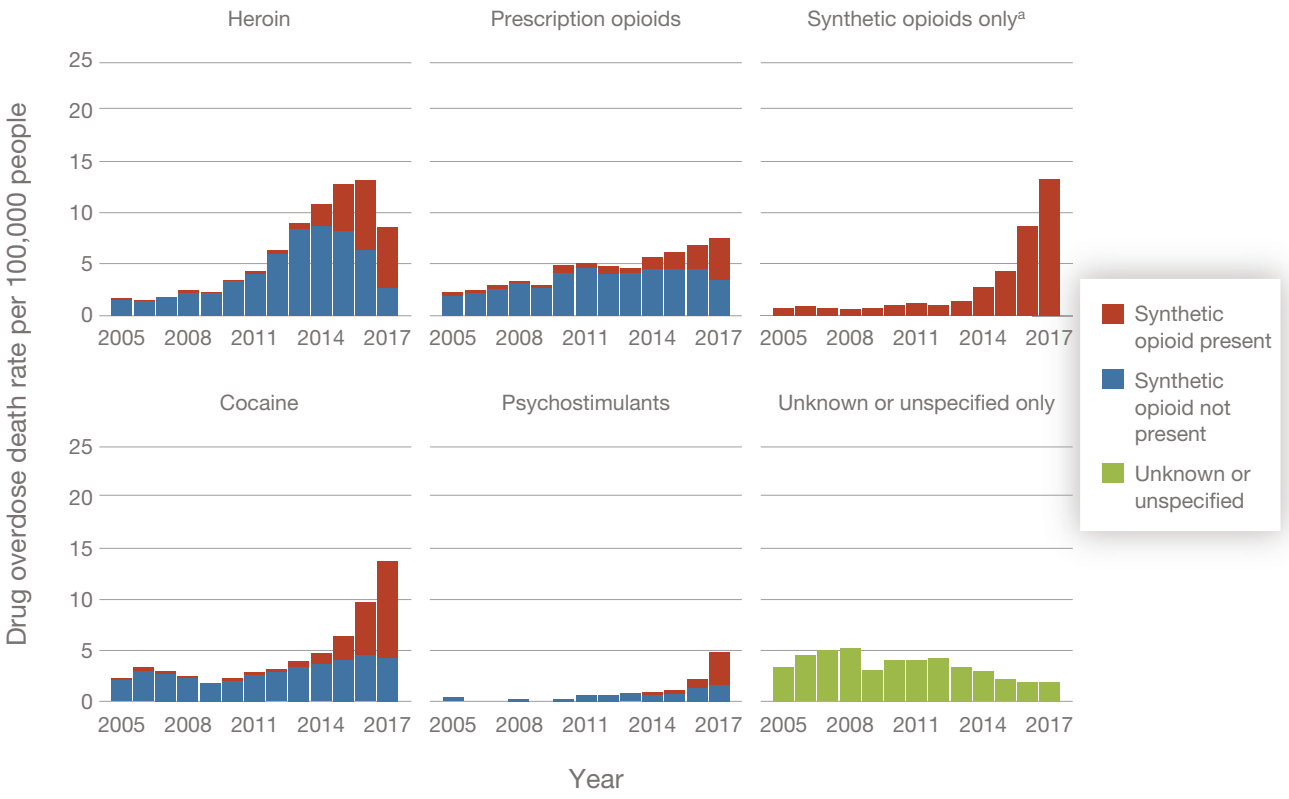
several drug categories. By 2017, about 80 percent of heroin overdose deaths, 70 percent of cocaine overdose deaths, and 45 percent of prescription opioid overdose deaths (which have been declining since 2014) in West Virginia were known to also involve synthetic opioids. Despite having the highest synthetic opioid overdose death rate in the country, rates of synthetic opioid–only overdoses remain below that of overdoses involving either heroin or prescription opioids. Most of the state's synthetic opioid overdose deaths occur with other drugs, consistent with national data that show approximately 80 percent of synthetic opioid–involved overdose deaths in 2016 involved alcohol and/or at least one other drug (Jones, Baldwin, and Compton, 2017).

Synthetic opioid overdose deaths in Ohio have risen sharply, starting in 2013. By 2017, the state had the second-highest synthetic opioid overdose death rate in the country. Figure 6 shows that reported heroin overdose deaths fell in 2017 for the first time since 2009, and there are no longer many deaths that mention heroin but not also synthetic opioids. This trend suggests that heroin markets in Ohio could be transitioning toward synthetic opioids replacing rather than augmenting heroin. Indeed, synthetic opioids' reach is not limited to heroin markets. In 2017, about 70 percent of cocaine and psychostimulant overdoses and about half of prescription opioid overdoses in Ohio also mentioned synthetic opioids. Prescription opioids, alone or in combination with synthetic opioids, are a smaller part of the overdose problem in Ohio.

New Hampshire had the third-highest overdose death rate in 2017 from synthetic opioids. Synthetic opioid–only deaths are even more prevalent than in Ohio (just more than 20 deaths per 100,000 people, compared with about 12 deaths per 100,000 people in Ohio) and are clearly the driver of drug overdose

FIGURE 6

Drug Overdose Death Rate per 100,000 People in Ohio



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[a] Excludes cocaine, heroin, prescription opioid, and psychostimulant deaths.

mortality in the state. In New Hampshire, heroin and prescription opioid overdoses have declined since peaking in 2014, while synthetic opioid overdoses continued to rise year over year. In 2017, three-quarters of overdose deaths in New Hampshire for heroin, cocaine, or psychostimulants and about one-third of prescription opioid overdose deaths also involved synthetic opioids. As shown in Figure 7, declining rates of overdose deaths that exclude synthetic opioids suggest that these potent drugs are present across many drug markets in that state.

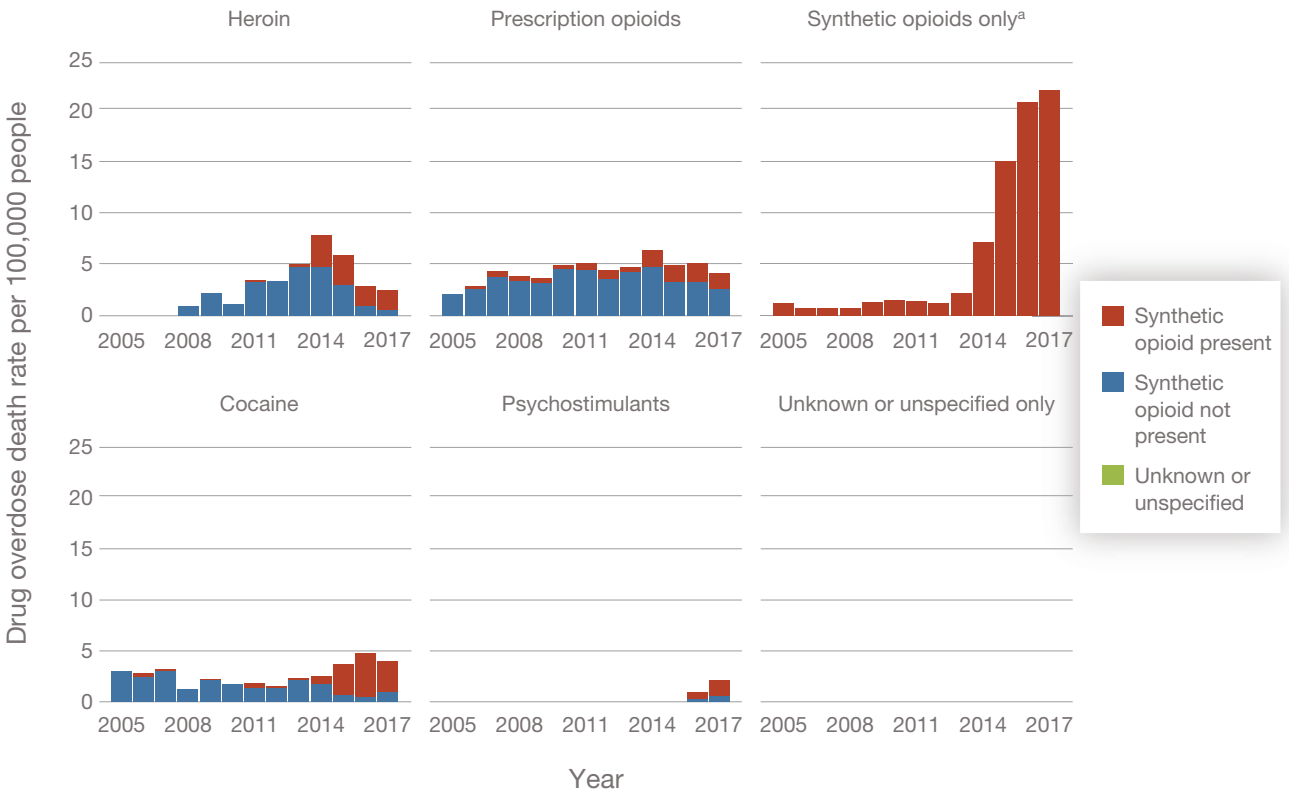
Declining rates of heroin overdoses, especially those that are free of synthetic opioids, could indicate that markets are transitioning from synthetic opioids appearing as an adulterant within heroin to synthetic opioids replacing heroin altogether. The pattern in New Hampshire is particularly striking. The rate of synthetic opioid–only deaths (i.e., deaths that exclude cocaine, heroin, prescription opioids, or psychostimulants) has exceeded the rate of other drug-involved deaths by a factor of five. In this state, few drug users are overdosing and dying of drugs other than synthetic opioids.

In 2017, only about three in ten synthetic opioid overdoses in West Virginia and four in ten in Ohio did not involve other drugs, such as heroin, cocaine, prescription opioids, or psychostimulants, suggesting that drug users are still exposed to traditional illicit drugs. These rates may indicate that markets are still in transition. However, eight in ten synthetic opioid overdoses in New Hampshire did not involve heroin, prescription opioids, cocaine, or psychostimulants, suggesting that markets have transitioned away from traditional drugs.

We examine potential shifts in the drug supply by comparing per capita seizure counts for heroin and for fentanyl and fentanyl analogs (shown as "fentanyls" in Figure 8) in Massachusetts, New

FIGURE 7

Drug Overdose Death Rate per 100,000 People in New Hampshire



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[a] Excludes cocaine, heroin, prescription opioid, and psychostimulant deaths.

Hampshire, Ohio, and West Virginia. Because these are NFLIS counts, we are unable to determine how many seizures contain both heroin and fentanyl.[7] In all four states, however, per capita heroin counts began declining around 2014, while seizure counts for fentanyls increased each year, starting in 2013 or 2014. Fentanyls overtook heroin seizure counts in all states except West Virginia. This happened earliest in New Hampshire, starting in 2015. In these acutely affected markets, NFLIS counts suggest that fentanyl is displacing heroin.

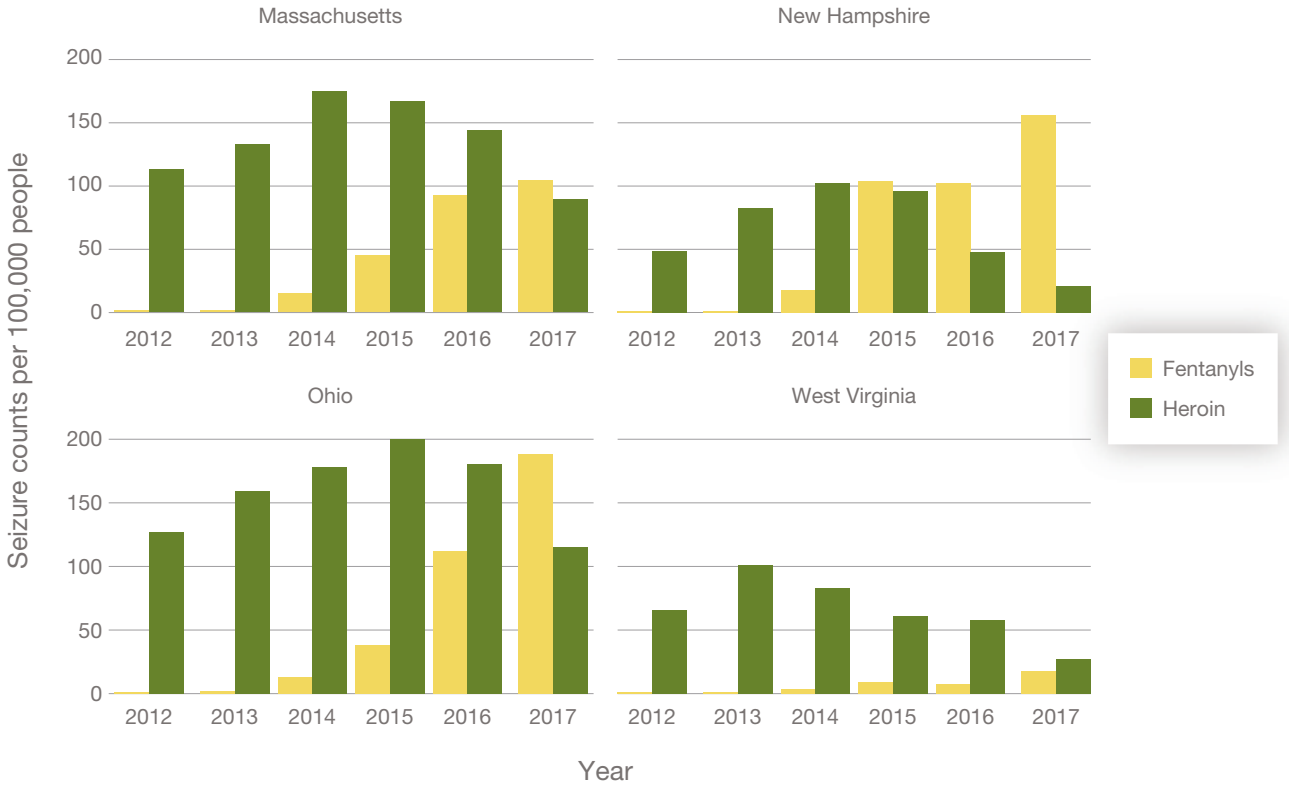
Cocaine-Related Overdoses Increasingly Mention Synthetic Opioids

Nationally, the number of overdose deaths involving cocaine has been rising every year since 2012. However, as noted by recent CDC analysis, the rise is not driven by overdoses involving cocaine alone (Kariisa et al., 2019). It is largely driven instead by overdoses that involve exposure to both cocaine and opioids, especially synthetic opioids in more-recent years. A death certificate that mentions both cocaine and synthetic opioids could mean that the decedent took both drugs separately or that dealers are selling cocaine that contains synthetic opioids. Cocaine that contains synthetic opioids may be even more dangerous than heroin that has been adulterated with fentanyl because many people who use cocaine have not developed a tolerance to opioids (i.e., they are *opioid-naive*) and are thus at high risk for an opioid overdose.

There are at least two ways in which a synthetic opioid could find its way into cocaine. The first is intentional mixing, either on the part of the dealer or the user (Tomassoni et al., 2017). The second is unintentional mixing, which may occur if drug dealers fail to properly clean surfaces or equipment they used to mix synthetic opioids with other drugs, resulting in contamination.[8] The existence of deaths that involve cocaine and synthetic opioids but not heroin is circumstantial evidence suggesting that mixing

FIGURE 8

Seizure Counts of Heroin and Fentanyls Reported to NFLIS per 100,000 People, 2012–2017



may occur, but the present data do not permit stronger statements about the intentions of the dealers. The following findings are similar to those reported by Kariisa et al., 2019, yet offer a more-detailed look at the variation of cocaine overdoses that also mention heroin and synthetic opioids in several states that are acutely affected.

Figure 9 plots cocaine overdose deaths, showing the share for which heroin, synthetic opioids, or both are present. U.S. cocaine consumption fell sharply from 2006 to 2010 (Caulkins et al., 2015), and overall cocaine overdose deaths hit a nadir in 2010, but the number of cocaine overdose deaths in which heroin was present started to rise the following year. By 2015, about half of cocaine overdose deaths also mentioned either heroin or synthetic opioids, and by 2017, slightly more than half of cocaine overdose deaths also mentioned synthetic opioids in particular. The number of cocaine overdose deaths absent illicit opioids has increased since 2014 but remains below the 2006 level and well below the peak of the earlier cocaine epidemic (Jones, Baldwin, and Compton, 2017).

Cocaine overdose deaths at the state level show similar broad trends, but the trends can be more pronounced because the national figures average outcomes in states that have been exposed to synthetic opioids and other states where synthetic opioids are not yet so common. Trends for Ohio illustrate this point (Figure 10). Ohio had relatively stable cocaine overdose fatalities through 2010, with most involving only cocaine and not heroin or synthetic opioids. Deaths began to increase in 2011; by 2012, about half of cocaine deaths in the state included illicit opioids, such as heroin. The total number of cocaine-involved deaths has soared in the last few years, and the share that also involved synthetic opioids—as opposed to heroin—rose dramatically starting in 2014. By 2016, half of the cocaine deaths in Ohio included synthetic opioids; of those, only three in ten included heroin.

Trends in West Virginia are broadly similar to those in Ohio, although with far greater variability year to year (Figure 11). New Hampshire's rates of cocaine-involved overdose deaths were always much lower, but as in Ohio and West Virginia, the share that included synthetic opioids increased dramatically starting in 2014 (Figure 12). Unlike in Ohio and West Virginia, cocaine overdose deaths in New Hampshire actually declined in 2017 for the first time since 2012, yet the majority of cocaine-involved deaths still involve synthetic opioids.

By 2015, about half of cocaine overdose deaths also mentioned either heroin or synthetic opioids, and by 2017, slightly more than half of cocaine overdose deaths also mentioned synthetic opioids in particular.

Discussion

The synthetic opioid surge in the United States is a public health emergency. A close examination of drug overdose mortality data and NFLIS seizure data provides insights into how fentanyl and other synthetic opioids are increasing harms. We note three broad findings.

First, among states with "very good to excellent" overdose reporting, synthetic opioid overdoses remain spatially concentrated. There is a clear east-west divide, with higher rates of overdose deaths and drug seizures for synthetic opioids in the east, and there is sharp regional variation even within the east. In 2017, deaths were particularly concentrated in Ohio, West Virginia, and in New England. Even within states that have been hit hard, overdose deaths remain concentrated in counties where these drugs initially surged and in nearby counties.

FIGURE 9

Cocaine Overdose Deaths in the United States with Mention of Heroin and Synthetic Opioids, 2005–2017

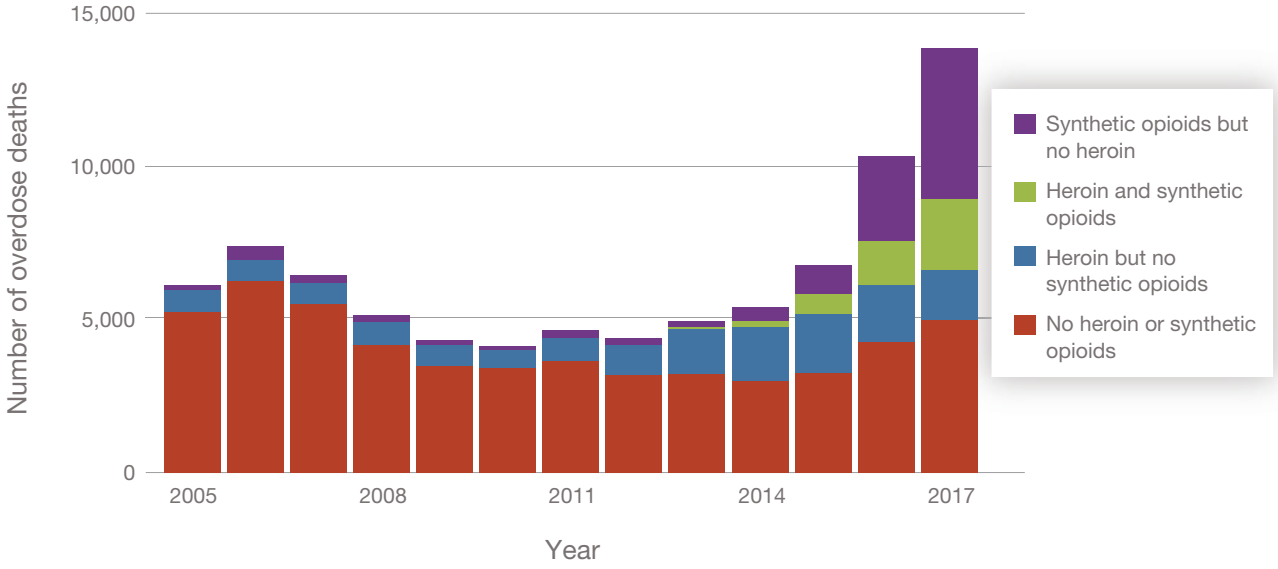


FIGURE 10

Cocaine Overdose Death Rate per 100,000 People in Ohio with Mention of Heroin and Synthetic Opioids, 2005–2017

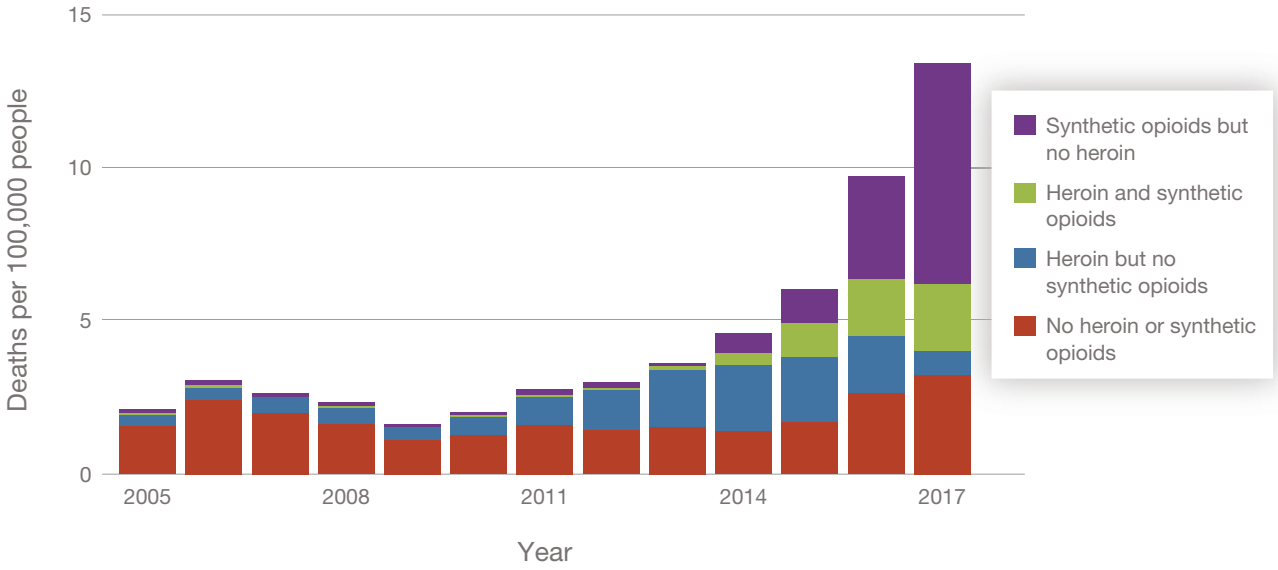


FIGURE 11

Cocaine Overdose Death Rate per 100,000 People in West Virginia with Mention of Heroin and Synthetic Opioids, 2005–2017

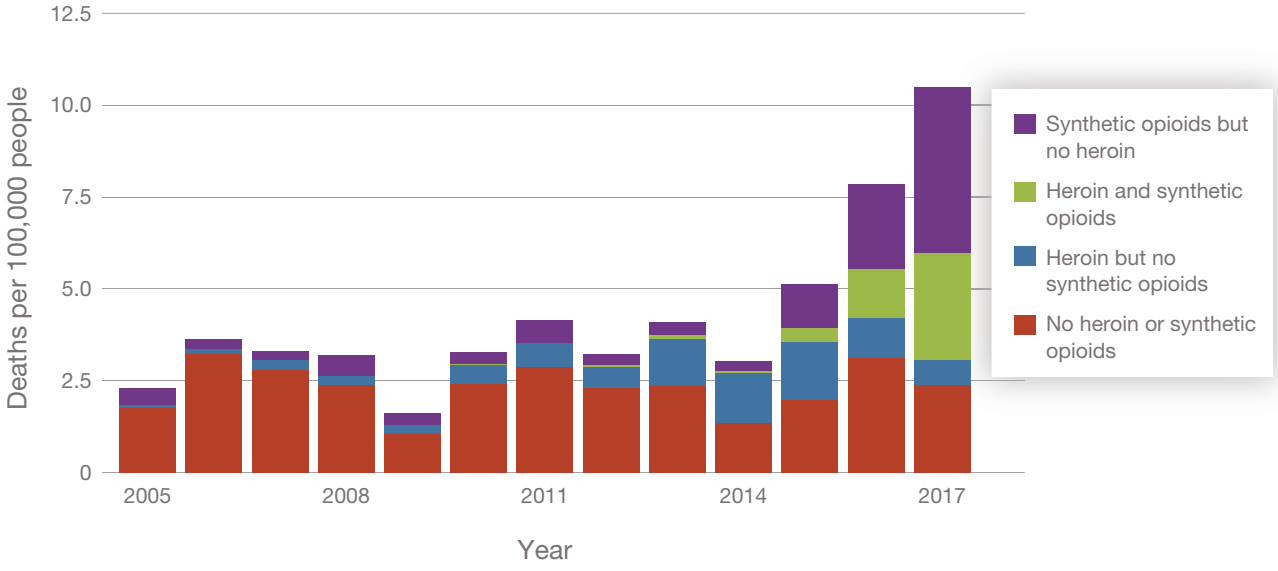
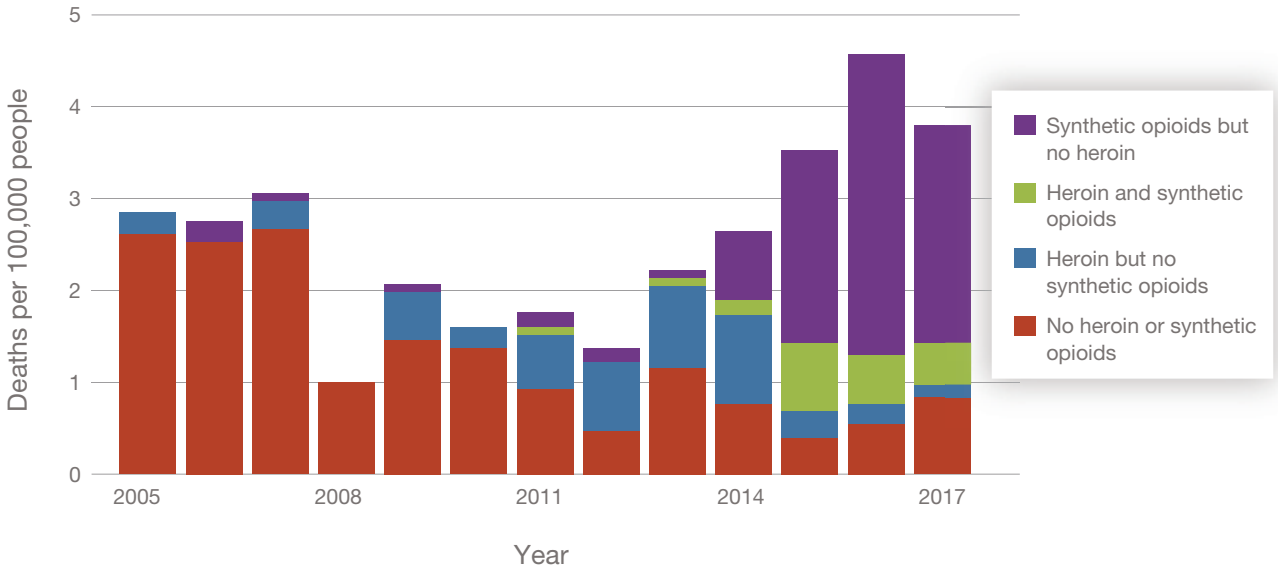


FIGURE 12

Cocaine Overdose Death Rate per 100,000 People in New Hampshire with Mention of Heroin and Synthetic Opioids, 2005–2017



The spatial concentration of synthetic opioid overdose deaths, and of drug seizures containing fentanyl or fentanyl analogs, implies there are a lot of markets that synthetic opioids have not yet entered in force but might enter in the future.

The spatial concentration of synthetic opioid overdose deaths, and of drug seizures containing fentanyl or fentanyl analogs, implies there are a lot of markets that synthetic opioids have not yet entered in force but might enter in the future. That possibility means there are two distinct policy challenges: How should communities highly exposed to synthetic opioids deal with the very high death rates, and how should communities not yet exposed avoid going down that path? It also implies that the problem may get worse before it gets better as synthetic opioids expand their geographic footprint. Indeed, national provisional overdose data for 2018 indicate a continued, albeit slower, increase in deaths involving synthetic opioids, while deaths involving heroin or prescription opioids continued to fall (Ahmad et al., 2019).

Second, the share of overdoses involving heroin is declining, and the share involving heroin but not synthetic opioids is falling especially fast, at least in places where fentanyl hit first. In 2017, data show that New Hampshire, Ohio, and West Virginia might no longer have heroin-dominant markets per se but instead markets that sell synthetic opioids either overtly or as heroin. New Hampshire appears to be particularly far along in this transition. These data are further supported by analysis of heroin and fentanyl seizures reported to NFLIS by law enforcement in these states.

A transitioning of opioid markets from heroin to more-potent synthetic opioids could have broad effects on public health and public safety and require new approaches given the specific challenges posed by these chemicals. For example, their potency may require additional administrations of naloxone to reverse overdoses. Also, their shorter duration of action may increase the number of times the drugs are injected per day, potentially exacerbating the spread of blood-borne diseases and the degree to which opioid use disorders disrupt daily life functioning. The counterfeit tablet phenomenon adds additional policy challenges because some individuals seeking diverted prescription medications, such as prescription opioids and benzodiazepines (perhaps to avoid injection), may unknowingly come into contact with potent synthetic opioids. Furthermore, the population of those who misuse prescription pills is larger than the number of those who inject heroin.

Lastly, the data show that cocaine-related overdoses increasingly mention synthetic opioids. The near tripling since 2013 in overdose deaths involving cocaine is driven in large part by deaths that also involve synthetic opioids. CDC mortality data cannot determine whether the decedent took both drugs separately or whether the cocaine was intentionally or unintentionally mixed with fentanyl. Either way, those who use only cocaine or psychostimulants or who use opioids infrequently lack opioid tolerance, putting them at great risk for a fatal overdose when they are exposed to synthetic opioids. This vulnerability suggests the need for interventions aimed specifically at reducing the risk of overdose in these populations. Such interventions might include public alerts or education about this risk, investment in the development of better fentanyl testing strips, and distribution of naloxone beyond traditional opioid-using groups, including to people who do not intend to use opioids.

We are cautious to interpret the increasing share of cocaine deaths involving synthetic opioids as a sign that drug dealers are intentionally adulterating cocaine with fentanyl (Daly, 2019). However, such activity would have drastic outcomes on the market; thus, it warrants consideration. As of 2016, national seizure data suggest that less than 1 percent of fentanyl seizures also contain cocaine (DEA, 2018). A more-precise measure would be to evaluate drug seizures at the local level, especially in state markets where synthetic opioids are prevalent. Including other data from qualitative findings from users and dealers would also improve our understanding of this worrisome phenomenon.

We describe the jump in synthetic opioid overdoses as a surge, albeit one that currently appears to be localized. These substances arrived suddenly and forcefully, catching many researchers, policymakers, and drug users by surprise. Because of this, many existing data collection and analysis systems have been overwhelmed by the increased harms generated by potent opioids. The CDC notes that a minority of states are not recording the specific drugs involved in overdose deaths in many cases (Scholl et al., 2019); however, most states have increased the percentage of overdose deaths listing specific drugs over the past decade. Although it is unlikely that the recent increases of synthetic opioid overdoses are a result only of enhanced reporting, it may account for part of these spatial and temporal trends. Therefore, we note this possibility as a potential limitation to our analysis and a motivation for improving data collection and analysis systems with regard to the synthetic opioid surge, including enhanced mortality reporting.

An examination of overdose trends in not-yet-released 2018 data will help us better understand local developments. Nevertheless, this analysis of data through 2017 is sufficient to show the dramatic changes wrought in several regional markets, and the potential vulnerability of other markets that have largely been spared to date. All of these trends are new; fentanyl and synthetic opioids emerged on such a grand scale only beginning in late 2013. Drug policy needs to account for how rapidly these potent opioids are upending the old order.

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Notes

[1] Methadone is a synthetic opioid but is reported separately in its own poisoning code. Therefore, synthetic opioid overdoses examined here are caused by other prescribed synthetic opioids (e.g., tramadol, prescription fentanyl) and illicitly manufactured synthetic opioids, such as fentanyl and its many analogs.

[2] The CDC has published an analysis with similar results (Kariisa et al., 2019).

[3] Although synthetic opioids are contributing to an upward trend in cocaine and psychostimulant overdose deaths, a large number of these deaths also involve other opioids, such as heroin and prescription pain relievers. This issue is explored further in Figure 9 with regard to cocaine overdoses.

[4] Pennsylvania may be a constructive example. Its uncategorized overdose deaths were stable between 2005 and 2013 but doubled since 2014, when fentanyl started to appear in neighboring states. The number of uncategorized overdoses in Pennsylvania now outnumbers overdose fatalities that involve heroin or synthetic opioids by factors of three and 1.25, respectively.

[5] Although a simple examination of the number of synthetic opioid deaths would have included Delaware as the tenth, Scholl et al., 2019, notes that the state does not have good or excellent reporting in drug overdose death records, so we exclude it.

[6] A similar analysis (not displayed) for all opioid overdoses (i.e., death certificates that include T40.0–T40.4, T40.6) reports a similar overlap in overdose death rates across the same counties in states with "very good to excellent" drug overdose death reporting.

[7] In NFLIS, a single drug seizure containing both heroin and fentanyl would be counted twice, once for heroin and once for fentanyl.

[8] A third possibility is that someone who buys cocaine on the dark web could be shipped synthetic opioids instead. We are not aware of this practice occurring, but some dark web dealers are known to mislabel drug listings (Quintana et al., 2017).

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About This Report

This report details trends in fatal drug overdoses and drug seizures involving synthetic opioids. Little attention has been given to untangling the meaning of fatal overdoses mentioning synthetic opioids in addition to other drugs and what variation in overdose deaths and drug seizures may reveal about the diffusion of synthetic opioids in illicit drug markets.

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