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Increases in Drug and Opioid Overdose Deaths—United States, 2000–2014

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The United States is experiencing an epidemic of drug overdose (poisoning) deaths. Since 2000, the rate of deaths from drug overdoses has increased 137%, including a 200% increase in the rate of overdose deaths involving opioids (opioid pain relievers and heroin). CDC analyzed recent multiple cause-of-death mortality data to examine current trends and characteristics of drug overdose deaths, including the types of opioids associated with drug overdose deaths. During 2014, a total of 47 055 drug overdose deaths occurred in the United States, representing a 1-year increase of 6.5%, from 13.8 per 100 000 persons in 2013 to 14.7 per 100 000 persons in 2014. The rate of drug overdose deaths increased significantly for both sexes, persons aged 25–44 years and ≥55 years, non-Hispanic whites and non-Hispanic blacks, and in the Northeastern, Midwestern, and Southern regions of the United States. Rates of opioid overdose deaths also increased significantly, from 7.9 per 100 000 in 2013 to 9.0 per 100 000 in 2014, a 14% increase. Historically, CDC has programmatically characterized all opioid pain reliever deaths (natural and semisynthetic opioids, methadone, and other synthetic opioids) as "prescription" opioid overdoses (1). Between 2013 and 2014, the age-adjusted rate of death involving methadone remained unchanged; however, the age-adjusted rate of death involving natural and semisynthetic opioid pain relievers, heroin, and synthetic opioids, other than methadone (e.g. fentanyl) increased 9%, 26%, and 80%, respectively. The sharp increase in deaths involving synthetic opioids, other than methadone, in 2014 coincided with law enforcement reports of increased availability of illicitly manufactured fentanyl, a synthetic opioid; however, illicitly manufactured fentanyl cannot be distinguished from prescription fentanyl in death certificate data. These findings indicate that the opioid overdose epidemic is worsening. There is a need for continued action to prevent opioid abuse, dependence, and death, improve treatment capacity for opioid use disorders, and reduce the supply of illicit opioids, particularly heroin and illicit fentanyl.

The National Vital Statistics System multiple cause-of-death mortality files were used to identify drug overdose deaths.[*] Drug overdose deaths were classified using the *International Classification of Disease, Tenth Revision* (ICD-10), based on the ICD-10 underlying cause-of-death codes X40–44 (unintentional), X60–64 (suicide), X85 (homicide), or Y10–Y14 (undetermined intent) (2). Among the deaths with drug overdose as the underlying cause, the type of opioid involved is indicated by the following ICD-10 multiple cause-of-death codes: opioids (T40.0, T40.1, T40.2, T40.3, T40.4, or T40.6); natural and semisynthetic opioids (T40.2); methadone (T40.3); synthetic opioids, other than methadone (T40.4); and heroin (T40.1). Some deaths involve more than one type of opioid; these deaths were included in the rates for each category (e.g. a death involving both a synthetic opioid and heroin would be included in the rates for synthetic opioid deaths and in the rates for heroin deaths). Age-adjusted death rates were calculated by applying age-specific death rates to the 2000 U.S. standard population age distribution (3). Significance testing was based on the z-test at a significance level of 0.05.

During 2014, 47 055 drug overdose deaths occurred in the United States. Since 2000, the age-adjusted drug overdose death rate has more than doubled, from 6.2 per 100 000 persons in 2000 to 14.7 per 100 000 in 2014 (Figure 1). The overall number and rate of drug overdose deaths increased significantly from 2013 to 2014, with an additional 3073 deaths occurring in 2014 (Table 1), resulting in a 6.5% increase in the age-adjusted rate. From 2013 to 2014, statistically significant increases in drug overdose death rates were seen for both males and females, persons aged 25–34 years, 35–44 years, 55–64 years, and ≥65 years; non-Hispanic whites and non-Hispanic blacks; and residents in the Northeast, Midwest and South Census Regions (Table 1). In 2014, the 5 states with the highest rates of drug overdose deaths were West Virginia (35.5 deaths per 100 000), New Mexico (27.3), New Hampshire (26.2), Kentucky (24.7) and Ohio (24.6).[†] States with statistically significant increases in the rate of drug overdose deaths from 2013 to 2014 included Alabama, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Mexico, North Dakota, Ohio, Pennsylvania, and Virginia.

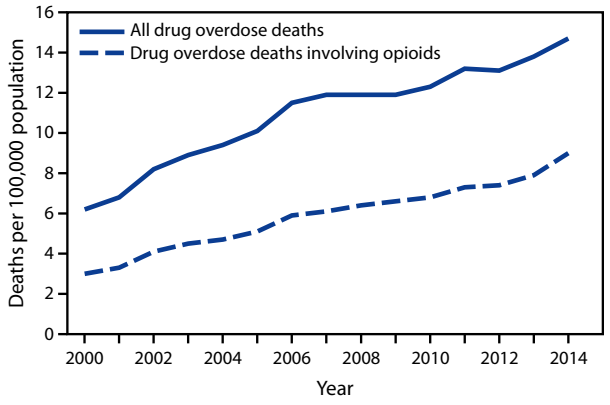

Figure 1: Age-adjusted rate[*] of drug overdose deaths[†] and drug overdose deaths involving opioids[§,¶] —United States, 2000–2014. Source: National Vital Statistics System, Mortality file. *Age-adjusted death rates were calculated by applying age-specific death rates to the 2000 U.S. standard population age distribution. [†]Drug overdose deaths are identified using *International Classification of Diseases, Tenth Revision* underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14. [§]Drug overdose deaths involving opioids are drug overdose deaths with a multiple cause-of-death code of T40.0, T40.1, T40.2, T40.3, T40.4, or T40.6. Approximately one-fifth of drug overdose deaths lack information on the specific drugs involved. Some of these deaths might involve opioids. [¶]Opioids include drugs such as morphine, oxycodone, hydrocodone, heroin, methadone, fentanyl, and tramadol. Alternate Text: The figure above is a line chart showing the age-adjusted rates of drug overdose deaths and drug overdose deaths involving opioids in the United States during 2000–2014.

In 2014, 61% (28 647, data not shown) of drug overdose deaths involved some type of opioid, including heroin. The age-adjusted rate of drug overdose deaths involving opioids increased significantly from 2000 to 2014, increasing 14% from 2013 (7.9 per 100 000) to 2014 (9.0) (Figure 1). From 2013 to 2014, the largest increase in the rate of drug overdose deaths involved synthetic opioids, other than methadone (e.g. fentanyl and tramadol), which nearly doubled from 1.0 per 100 000 to 1.8 per 100 000 (Figure 2). Heroin overdose death rates increased by 26% from 2013 to 2014 and have more than tripled since 2010, from 1.0 per 100 000 in 2010 to 3.4 per 100 000 in 2014 (Figure 2). In 2014, the rate of drug overdose deaths involving natural and semisynthetic opioids (e.g. morphine, oxycodone, and hydrocodone), 3.8 per 100 000, was the highest among opioid overdose deaths, and increased 9% from 3.5 per 100 000 in 2013. The rate of drug overdose deaths involving methadone, a synthetic opioid classified separately from other synthetic opioids, was similar in 2013 and 2014.

Discussion

More persons died from drug overdoses in the United States in 2014 than during any previous year on record. From 2000 to 2014 nearly half a million persons in the United States have died from drug overdoses. In 2014, there were approximately one and a half times more drug overdose deaths in the United States than deaths from motor vehicle crashes (4). Opioids, primarily prescription pain relievers and heroin, are the main drugs associated with overdose deaths. In 2014, opioids were involved in 28 647 deaths, or 61% of all drug overdose deaths; the rate of opioid overdoses has tripled since 2000. The 2014 data demonstrate that the United States' opioid overdose epidemic includes two distinct but interrelated trends: a 15-year increase in overdose deaths involving prescription opioid pain relievers and a recent surge in illicit opioid overdose deaths, driven largely by heroin.

Natural and semisynthetic opioids, which include the most commonly prescribed opioid pain relievers, oxycodone and hydrocodone, continue to be involved in more overdose deaths than any other opioid type. Although this category of opioid drug overdose death had declined in 2012 compared with 2011, and had held steady in 2013, there was a 9% increase in 2014.

Drug overdose deaths involving heroin continued to climb sharply, with heroin overdoses more than tripling in 4 years. This increase mirrors large increases in heroin use across the country (5) and has been shown to be closely tied to opioid pain reliever misuse and dependence. Past misuse of prescription opioids is the strongest risk factor for heroin initiation and use, specifically among persons who report past-year dependence or abuse (5). The increased availability of heroin, combined with its relatively low price (compared with diverted prescription opioids) and high purity appear to be major drivers of the upward trend in heroin use and overdose (6).

The rate of drug overdose deaths involving synthetic opioids nearly doubled between 2013 and 2014. This category includes both prescription synthetic opioids (e.g. fentanyl and tramadol) and non-pharmaceutical fentanyl manufactured in illegal laboratories (illicit fentanyl). Toxicology tests used by coroners and medical examiners are unable to distinguish between prescription and illicit fentanyl. Based on reports from states and drug seizure data, however, a substantial portion of the increase in synthetic opioid deaths appears to be related to increased availability of illicit fentanyl (7), although this cannot be confirmed with mortality data. For example, five jurisdictions (Florida, Maryland, Maine, Ohio, and Philadelphia, Pennsylvania) that reported sharp increases in illicit fentanyl seizures, and screened persons who died from a suspected drug overdose for fentanyl, detected similarly sharp increases in fentanyl-related deaths (7).[§] Finally, illicit fentanyl is often combined with heroin or sold as heroin. Illicit fentanyl might be contributing to recent increases in drug overdose deaths

Table 1: Number and age-adjusted rates of drug overdose deaths,[1] by sex, age, race and Hispanic origin,[2] Census region, and state — United States, 2013 and 2014

	2013		2014		
Decedent characteristic	No.	Age-adjusted rate	No.	Age-adjusted rate	% change from 2013 to 2014
All	43 982	13.8	47 055	14.7	6.5[3]
Sex					
Male	26 799	17.0	28 812	18.3	7.6[3]
Female	17 183	10.6	18 243	11.1	4.7[3]
Age group (years)					
0–14	105	0.2	109	0.2	0.0
15–24	3664	8.3	3798	8.6	3.6
25–34	8947	20.9	10 055	23.1	10.5[3]
35–44	9320	23.0	10 134	25.0	8.7[3]
45–54	12 045	27.5	12 263	28.2	2.5
55–64	7551	19.2	8122	20.3	5.7[3]
≥65	2344	5.2	2568	5.6	7.7[3]
Race and Hispanic origin[2]					
White, non-Hispanic	35 581	17.6	37 945	19.0	8.0[3]
Black, non-Hispanic	3928	9.7	4323	10.5	8.2[3]
Hispanic	3345	6.7	3504	6.7	0.0
Census region of residence					
Northeast	8403	14.8	9077	16.1	8.8[3]
Midwest	9745	14.6	10 647	16.0	9.6[3]
South	15 519	13.1	16 777	14.0	6.9[3]
West	10 315	13.6	10 554	13.7	0.7
State of residence					
Alabama	598	12.7	723	15.2	19.7[3]
Alaska	105	14.4	124	16.8	16.7
Arizona	1222	18.7	1211	18.2	−2.7
Arkansas	319	11.1	356	12.6	13.5
California	4452	11.1	4521	11.1	0.0
Colorado	846	15.5	899	16.3	5.2
Connecticut	582	16.0	623	17.6	10.0
Delaware	166	18.7	189	20.9	11.8
District of Columbia	102	15.0	96	14.2	−5.3
Florida	2474	12.6	2634	13.2	4.8
Georgia	1098	10.8	1206	11.9	10.2[3]
Hawaii	158	11.0	157	10.9	−0.9
Idaho	207	13.4	212	13.7	2.2
Illinois	1579	12.1	1705	13.1	8.3[3]
Indiana	1064	16.6	1172	18.2	9.6[3]
Iowa	275	9.3	264	8.8	−5.4
Kansas	331	12.0	332	11.7	−2.5
Kentucky	1019	23.7	1077	24.7	4.2
Louisiana	809	17.8	777	16.9	−5.1
Maine	174	13.2	216	16.8	27.3[3]
Maryland	892	14.6	1070	17.4	19.2[3]
Massachusetts	1081	16.0	1289	19.0	18.8[3]
Michigan	1553	15.9	1762	18.0	13.2[3]
Minnesota	523	9.6	517	9.6	0.0
Mississippi	316	10.8	336	11.6	7.4
Missouri	1025	17.5	1067	18.2	4.0
Montana	137	14.5	125	12.4	−14.5
Nebraska	117	6.5	125	7.2	10.8
Nevada	614	21.1	545	18.4	−12.8
New Hampshire	203	15.1	334	26.2	73.5[3]
New Jersey	1294	14.5	1253	14.0	−3.4
New Mexico	458	22.6	547	27.3	20.8[3]
New York	2309	11.3	2300	11.3	0.0
North Carolina	1259	12.9	1358	13.8	7.0
North Dakota	20	2.8	43	6.3	125.0[3]
Ohio	2347	20.8	2744	24.6	18.3[3]
Oklahoma	790	20.6	777	20.3	−1.5

Table 1. *Continued*

Decedent characteristic	2013 No.	2013 Age-adjusted rate	2014 No.	2014 Age-adjusted rate	% change from 2013 to 2014
Oregon	455	11.3	522	12.8	13.3
Pennsylvania	2426	19.4	2732	21.9	12.9[3]
Rhode Island	241	22.4	247	23.4	4.5
South Carolina	620	13.0	701	14.4	10.8
South Dakota	55	6.9	63	7.8	13.0
Tennessee	1187	18.1	1269	19.5	7.7
Texas	2446	9.3	2601	9.7	4.3
Utah	594	22.1	603	22.4	1.4
Vermont	93	15.1	83	13.9	−7.9
Virginia	854	10.2	980	11.7	14.7[3]
Washington	969	13.4	979	13.3	−0.7
West Virginia	570	32.2	627	35.5	10.2
Wisconsin	856	15.0	853	15.1	0.7
Wyoming	98	17.2	109	19.4	12.8

Source: National Vital Statistics System, Mortality file.
[1]Deaths are classified using the *International Classification of Diseases, Tenth Revision* (ICD–10). Drug overdose deaths are identified using underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14. Age-adjusted death rates were calculated by applying age-specific death rates to the 2000 U.S. standard population age distribution.
[2]Data for Hispanic origin should be interpreted with caution; studies comparing Hispanic origin on death certificates and on census surveys have shown inconsistent reporting on Hispanic ethnicity.
[3]Statistically significant change from 2013 to 2014.

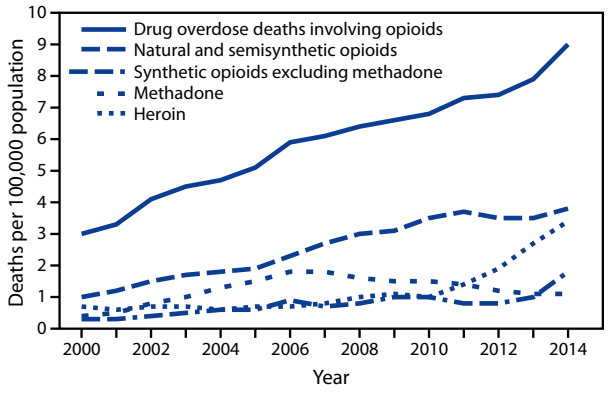

Figure 2: Drug overdose deaths[*] involving opioids,[†,§] by type of opioid[¶] — United States, 2000–2014. Source: National Vital Statistics System, Mortality file. *Age-adjusted death rates were calculated by applying age-specific death rates to the 2000 U.S. standard population age distribution. [†]Drug overdose deaths involving opioids are identified using *International Classification of Diseases, Tenth Revision* underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14 with a multiple cause code of T40.0, T40.1, T40.2, T40.3, T40.4, or T40.6. [§]Opioids include drugs such as morphine, oxycodone, hydrocodone, heroin, methadone, fentanyl, and tramadol. [¶]For each type of opioid, the multiple cause-of-death code was T40.1 for heroin, T40.2 for natural and semisynthetic opioids (e.g. oxycodone and hydrocodone), T40.3 for methadone, and T40.4 for synthetic opioids excluding methadone (e.g. fentanyl and tramadol). Deaths might involve more than one drug thus categories are not exclusive. Alternate Text: The figure above is a line chart showing drug overdose deaths involving opioids, by type of opioid, in the United States during 2000–2014.

involving heroin. Therefore, increases in illicit fentanyl-associated deaths might represent an emerging and troubling feature of the rise in illicit opioid overdoses that has been driven by heroin.

The findings in this report are subject to at least three limitations. First, several factors related to death investigation might affect estimates of death rates involving specific drugs. At autopsy, toxicological laboratory tests might be performed to determine the type of drugs present; however, the substances tested for and circumstances under which the tests are performed vary by jurisdiction. Second, in 2013 and 2014, 22% and 19% of drug overdose deaths, respectively, did not include information on the death certificate about the specific types of drugs involved. The percent of overdose deaths with specific drugs identified on the death certificate varies widely by state. Some of these deaths might have involved opioids. This increase in the reporting of specific drugs in 2014 might have contributed to some of the observed increases in drug overdose death rates involving different types of opioids from 2013 to 2014. Finally, some heroin deaths might be misclassified as morphine because morphine and heroin are metabolized similarly (8), which might result in an underreporting of heroin overdose deaths.

To reverse the epidemic of opioid drug overdose deaths and prevent opioid-related morbidity, efforts to improve safer prescribing of prescription opioids must be intensified. Opioid pain reliever prescribing has quadrupled since 1999 and has increased in parallel with overdoses involving the most commonly used opioid pain relievers

(1). CDC has developed a draft guideline for the prescribing of opioids for chronic pain to address this need.[¶]

In addition, efforts are needed to protect persons already dependent on opioids from overdose and other harms. This includes expanding access to and use of naloxone (a safe and effective antidote for all opioid-related overdoses)[**] and increasing access to medication-assisted treatment, in combination with behavioral therapies (9). Efforts to ensure access to integrated prevention services, including access to syringe service programs when available, is also an important consideration to prevent the spread of hepatitis C virus and human immunodeficiency virus infections from injection drug use.

Summary

What is already known on this topic?
The rate for drug overdose deaths has increased approximately 140% since 2000, driven largely by opioid overdose deaths. After increasing since the 1990s, deaths involving the most commonly prescribed opioid pain relievers (i.e. natural and semisynthetic opioids) declined slightly in 2012 and remained steady in 2013, showing some signs of progress. Heroin overdose deaths have been sharply increasing since 2010.

What is added by this report?
Drug overdose deaths increased significantly from 2013 to 2014. Increases in opioid overdose deaths were the main factor in the increase in drug overdose deaths. The death rate from the most commonly prescribed opioid pain relievers (natural and semisynthetic opioids) increased 9%, the death rate from heroin increased 26%, and the death rate from synthetic opioids, a category that includes illicitly manufactured fentanyl and synthetic opioid pain relievers other than methadone, increased 80%. Nearly every aspect of the opioid overdose death epidemic worsened in 2014.

What are the implications for public health practice?
Efforts to encourage safer prescribing of opioid pain relievers should be strengthened. Other key prevention strategies include expanding availability and access to naloxone (an antidote for all opioid-related overdoses), increasing access to medication-assisted treatment in combination with behavioral therapies, and increasing access to syringe service programs to prevent the spread of hepatitis C virus infection and human immunodeficiency virus infections. Public health agencies, medical examiners and coroners, and law enforcement agencies can work collaboratively to improve detection of and response to outbreaks associated with drug overdoses related to illicit opioids.

Public health agencies, medical examiners and coroners, and law enforcement agencies can work collaboratively to improve detection of outbreaks of drug overdose deaths involving illicit opioids (including heroin and illicit fentanyl) through improved investigation and testing as well as reporting and monitoring of specific drugs, and facilitate a rapid and effective response that can address this emerging threat to public health and safety (7). Efforts are needed to distinguish the drugs contributing to overdoses to better understand this trend.

Notes

*Additional information available at http://www.cdc.gov/nchs/nvss/mortality_public_use_data.htm.
[†]Additional information available at http://www.cdc.gov/drugoverdose/data/statedeaths.html.
[§]Additional information available at http://pub.lucidpress.com/NDEWSFentanyl/.
[¶]Additional information available at http://www.cdc.gov/drugoverdose/prescribing/guideline.html.
**Additional information available at https://store.samhsa.gov/shin/content/SMA13-4742/Overdose_Toolkit_2014_Jan.pdf.

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