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Increases in Poisoning and Methadone-Related Deaths: United States, 1999-2005

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In 2005, poisoning remained the second leading cause of injury death in the United States, after surpassing firearms for the first time in 2004. The vast majority of poisoning deaths are due to unintentional drug overdoses. Narcotic-related deaths have played the largest role in the increase in all poisoning deaths from 1999 to 2005 (the years for which data are available). They accounted for 56 percent of all poisoning deaths in 2005, increasing from 50 percent in 1999. Their absolute numbers increased 84 percent over the 7 years. Methadone-related deaths have increased more than other narcotic-related deaths.

Methadone is a narcotic drug indicated both for the treatment of pain and for the treatment of opioid dependence. The cost of methadone is less than that of other narcotic pain killers. However, with the drug's half-life significantly longer than its effect on pain, the initial proper dosing of methadone is difficult and not all physicians are aware of its varying equivalence to other opioid medications. (Personal communication, Kenneth Hoffman, M.D., M.P.H., Center for Substance Abuse and Treatment, SAMHSA.) Guidelines addressing the complexity of the relationship between different types of opioids, including methadone, have been published by the Department of Defense and Veterans Administration (http://www.oqp.med.va.gov/cpg/cot/ot_base.htm and http://www.oqp.med.va.gov/cpg/cot/G/OT_Med.pdf accessed 30 Jan 2008).

It has been difficult to determine the extent to which increases in opioid-related deaths have been due to specific prescribing practices, improper taking of the medication by patients, diversion of the drug from the patient to someone else, or other means. In July 2007, a SAMHSA-sponsored conference on methadone mortality concluded that all forms of methadone distribution (tablets, diskettes, and solution) continue to rise, with the greatest rise in distribution coming from tablets distributed through pharmacies; and the circumstances of methadone-associated deaths vary by state, suggesting a complex phenomenon. (http://www.dpt.samhsa.gov/pdf/Methadone_Report_10_18_07_Brief_w_attch.pdf page 3 accessed 30 Jan 2008).

Trends in methadone deaths and death rates

From 1999 to 2005, poisoning deaths increased 66 percent from 19,741 to 32,691 deaths, whereas the number of poisoning deaths mentioning methadone increased 468 percent to 4,462 ([Figure 1](#)). Poisoning deaths mentioning methadone increased from 4 percent of all poisoning deaths to 14 percent of all poisoning deaths. Most recently, all poisoning deaths increased 8 percent from 2004 to 2005, whereas those mentioning methadone increased 16 percent.

Of all narcotic drugs mentioned in poisoning deaths, methadone had the largest relative increases. The absolute number of poisoning deaths mentioning methadone was less, however, than the number of deaths mentioning cocaine or other opioids. Other opioids include pain relief drugs such as oxycodone, hydrocodone, and fentanyl ([Table 1](#)).

Since 1999, between 73 and 80 percent of poisoning deaths mentioning methadone have been classified as unintentional (3,701 such deaths in 2005), with an additional 11 to 13 percent being of undetermined intent, 5 to 7 percent as suicides, less than 1 percent as homicides, and about 1 percent were injuries other than poisoning. Over this same period, 3 to 6 percent of deaths where methadone was mentioned were not coded as injury deaths ([Table 2](#)).

Age

Age-specific rates for methadone death are higher for persons age 35-44 and 45-54 years than for those younger or older. This pattern has been true for all of the 1999-2005 period ([Figure 2](#)). Admittedly, the rates are quite low relative to all poisoning deaths, but the patterns are similar in that the rates are high for those in middle-age groups. Among those aged 55-64 years, the rate in 2005 was nine times the rate in 1999; for those in each of the 10-year age groups covering the span 25-54 years, the rates in 2004 were four to six times the rates in 1999. The largest increase was for young persons 15-24 years; the rate in 2005 was 11 times that in 1999. The rate for those 15-24 years, however, was unchanged from 2004 to 2005.

States

[Table 3](#) shows state data for all poisoning deaths that mentioned methadone. State-specific comparisons should be interpreted with caution as many of the state-specific data are based on very small numbers. In 2005, crude state death rates for methadone-related deaths ranged from less than 1 per 100,000 in many of the largest states like California, New York, Texas, and Pennsylvania to 4 to 5 per 100,000 in Maine, Utah, Washington, Nevada, and Kentucky.

About the data

The estimates in this report are from the National Vital Statistics System (1). Poisoning deaths include those resulting from accidental or intentional overdoses of a drug, being given the wrong drug, taking the wrong drug in error, or taking a drug inadvertently. Poisoning deaths also include those associated with solid or liquid biological substances, gases or vapors, or other substances such as pesticides or unspecified chemicals. Deaths can be unintentional, intentional, or of undetermined intent (2). Such deaths can be defined either by their *International Classification of Diseases and Related Health Problems* (ICD)-10th revision external cause of injury codes or by their ICD-10 diagnosis codes. The external cause codes have two dimensions that indicate the broad categories of substances involved such as drugs and alcohol, and the intentionality of the death, reflecting whether the death was certified as unintentional, a suicide, homicide or legal intervention, or of undetermined intent. The ICD-10 external cause codes used to define poisoning as an underlying cause of death include X40-49, X60-X69, X85-X90, Y10-Y19, Y35.2, or *U01(.6-.7). These are the codes that have been adopted internationally to define poisoning in the external cause of injury matrix for ICD-10.

Poisoning diagnosis codes are used in conjunction with external cause codes to identify the specific substance(s) or agent(s) responsible. A poisoning death can have one or multiple substances listed on the death certificate; the ICD-10 codes range from T36.0-T65.9. Although these codes help to describe a poisoning-related underlying cause, they are not used for underlying cause-of-death coding (3). Rather, the corresponding external cause code will be designated as the underlying cause.

Methadone is classified separately from other opiates and related narcotics in ICD-10, which has been in use in the United States since 1999, but was not classified separately in ICD-9. The ICD-10 code for methadone is T40.3. This drug is listed within the overall category, ICD-10 T40, for "Poisoning by narcotics and psychodysleptics (hallucinogens)." An unquantifiable proportion of the increase in methadone deaths is due to improvements in data collection and processing, particularly between 2001 and 2002.

References

1. The National Vital Statistics System is described fully in http://www.cdc.gov/nchs/data/nvsr/nvsr56/nvsr56_10.pdf.
2. World Health Organization. *International Statistical Classification of Diseases and Related Health Problems (Tenth Revision)*, volume 1. Geneva, World Health Organization. 1992.
3. Minino AM, Anderson RN, Fingerhut LA, Boudreault MA, Warner M. *Deaths: Injuries, 2002*. National vital statistics reports; vol 54 no 10. Hyattsville, MD: National Center for Health Statistics. 2006.

Tables

Table 1. Number of poisoning deaths in which specific narcotics and psychodysleptics are mentioned: United States, 1999-2005

ICD-10 code	Substance	1999	2000	2001	2002	2003	2004	2005	Percent change 1999-2005	Percent change 2004-2005
	All poisoning	19,741	20,230	22,242	26,435	28,700	30,308	32,691	65.6	7.9
T40	Poisoning by narcotics and psychodysleptics, all	9,955	10,173	11,480	14,247	15,731	16,735	18,347	84.3	9.6
T40.1	Heroin	1,964	1,846	1,782	2,091	2,080	1,881	2,011	2.4	6.9
T40.2	Other opioids	2,757	2,932	3,484	4,431	4,877	5,242	5,789	110.0	10.4
T40.3	Methadone	786	988	1,456	2,360	2,974	3,849	4,462	467.7	15.9
T40.4	Other synthetic narcotics	732	784	962	1,301	1,406	1,668	1,744	138.3	4.6
T40.5	Cocaine	3,832	3,565	3,840	4,612	5,212	5,461	6,228	62.5	14.0
T40.6	Other and unspecified narcotics	2,902	2,880	2,881	3,143	3,117	2,761	2,875	-0.9	4.1
T40.7	Cannabis	37	41	37	50	61	99	112	202.7	13.1

NOTES: Substance-specific data are not additive because a death certificate could have multiple drugs listed. ICD is International Classification of Diseases. Poisoning deaths for Opium (ICD-10 T40.0), LSD (ICD-10 T40.8), and Other and unspecified psychodysleptics (ICD-10 T40.9) are not shown separately because there were fewer than 10 deaths in any year.

SOURCE: CDC/NCHS, National Vital Statistics System.

Table 2a. Deaths with mention of methadone for poisoning, other injury and noninjury causes of death and percent change: United States, 1999-2005

	1999	2000	2001	2002	2003	2004	2005	Percent change 2004-2005	Percent change 1999-2005
All poisoning deaths	19,741	20,230	22,242	26,435	28,700	30,308	32,691	8	66
All poisoning deaths with mention of methadone	786	988	1,456	2,360	2,974	3,849	4,462	16	468
All deaths (injury and noninjury) with mention of methadone	831	1,060	1,559	2,471	3,117	4,031	4,638	15	458
Unintentional poisoning with mention of methadone	623	778	1,158	1,911	2,452	3,202	3,701	16	494
Suicide by poisoning with mention of methadone	56	72	111	149	146	195	232	19	314
Undetermined intent by poisoning with mention of methadone	105	138	186	295	370	441	523	19	398
Nonpoisoning injury deaths and nonjury deaths both with mention of methadone	45	72	103	111	143	182	176	-3	291

Table 2b. Percent distribution of deaths with mention of methadone for injury and noninjury causes of death: United States, 1999-2005

	1999	2000	2001	2002	2003	2004	2005
All deaths (injury and noninjury) with mention of methadone	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Unintentional poisoning with mention of methadone	75.0	73.4	74.3	77.3	78.7	79.4	79.8
Suicide by poisoning with mention of methadone	6.7	6.8	7.1	6.0	4.7	4.8	5.0
Homicide by poisoning with mention of methadone	0.2	0.0	0.1	0.2	0.2	0.3	0.1
Undetermined intent by poisoning with mention of methadone	12.6	13.0	11.9	11.9	11.9	10.9	11.3
Nonpoisoning injury deaths with mention of methadone	0.5	0.9	1.0	0.6	0.6	0.7	0.5
Noninjury deaths with mention of methadone	4.9	5.8	5.6	3.8	4.0	3.8	3.3

Note: Homicide by poisoning with mention of methadone is not shown separately because there were fewer than 10 deaths in any year.

0.0 Quantity more than zero but less than 0.05.

SOURCE: CDC/NCHS, data from the National Vital Statistics System.

Table 3a. Methadone-related poisoning deaths in 1999-2005, ratio of deaths in 2005 to deaths in 1999, and crude death rates for 2005, by state -- Number of methadone-related poisoning deaths¹

	1999	2000	2001	2002	2003	2004	2005	Ratio 2005:1999 ²	Methadone deaths per 100,000 population, 2005
United States total	786	988	1,456	2,360	2,974	3,849	4,462	5.7	1.5
Alabama	16	12	26	33	25	46	47	2.9	1.0
Arizona	20	14	28	57	71	66	87	4.4	1.5
Arkansas	9	3	9	32	36	50	53	5.9	1.9
California	73	51	37	115	144	205	214	2.9	0.6
Colorado	15	16	19	27	30	40	55	3.7	1.2
Florida	34	51	128	218	270	434	430	12.6	2.4
Georgia	14	16	41	50	71	95	123	8.8	1.3
Illinois	29	56	52	68	64	69	81	2.8	0.6
Indiana	5	5	13	20	45	33	51	10.2	0.8
Kansas	4	5	9	24	22	33	45	11.3	1.6
Kentucky	9	28	50	78	129	129	156	17.3	3.7
Louisiana	4	5	21	41	54	71	102	25.5	2.3
Maine	6	20	13	43	36	55	61	10.2	4.6
Maryland	7	18	20	24	40	96	145	20.7	2.6
Massachusetts	10	8	23	24	36	58	93	9.3	1.4
Michigan	12	14	15	43	50	97	126	10.5	1.2
Minnesota	11	5	12	16	25	33	35	3.2	0.7
Missouri	16	14	19	24	69	41	85	5.3	1.5
Nevada	18	24	47	50	50	86	93	5.2	3.9
New Hampshire	2	7	12	33	37	29	51	25.5	3.9
New Jersey	26	17	27	48	54	50	77	3.0	0.9
New Mexico	32	24	27	32	33	43	28	0.9	1.5
New York	120	94	126	135	147	137	179	1.5	0.9
North Carolina	47	90	107	190	249	267	299	6.4	3.4
Ohio	7	20	37	59	74	141	158	22.6	1.4
Oklahoma	20	38	42	43	92	129	111	5.6	3.1
Oregon	9	28	45	82	88	99	123	13.7	3.4
Pennsylvania	11	18	15	39	73	93	114	10.4	0.9
South Carolina	14	13	15	11	20	40	60	4.3	1.4
Tennessee	12	15	19	44	78	110	134	11.2	2.2
Texas	25	50	89	136	155	160	199	8.0	0.9
Utah	20	27	39	61	80	101	112	5.6	4.5
Virginia	20	37	74	90	112	114	121	6.1	1.6
Washington	52	66	83	140	160	252	269	5.2	4.3
West Virginia ³	7	8	38	76	68	106	60	Note 3	3.3
Wisconsin	11	18	21	39	41	72	72	6.5	1.3

Table 3b. Methadone-related poisoning deaths in 1999-2005, by state for states with fewer than 20 deaths in any of the years 2003-2005

	1999	2000	2001	2002	2003	2004	2005
Alaska	4	7	0	2	2	4	8
Connecticut	13	15	14	24	19	44	35
Delaware	1	4	4	8	13	8	9
Hawaii	5	3	6	14	7	16	18
Idaho	4	4	10	10	21	23	13
Iowa	2	1	2	8	6	12	21
Mississippi	2	1	5	4	12	5	23
Montana	3	2	3	10	24	21	15
Nebraska	0	2	0	5	0	2	12
North Dakota	0	1	2	2	0	3	1
Rhode Island	3	7	8	16	20	13	25
South Dakota	0	0	1	0	0	4	4
Vermont	1	2	3	5	11	6	16
Wyoming	1	3	0	4	1	3	4
District of Columbia	0	1	0	3	10	5	9

¹ Underlying cause of death was selected as all poisoning, regardless of intent; methadone was listed on the death certificate as contributing to the death.

² Interpret the U.S. ratio as follows: the number of deaths in the U.S. in 2005 was 5.7 times the number in 1999.

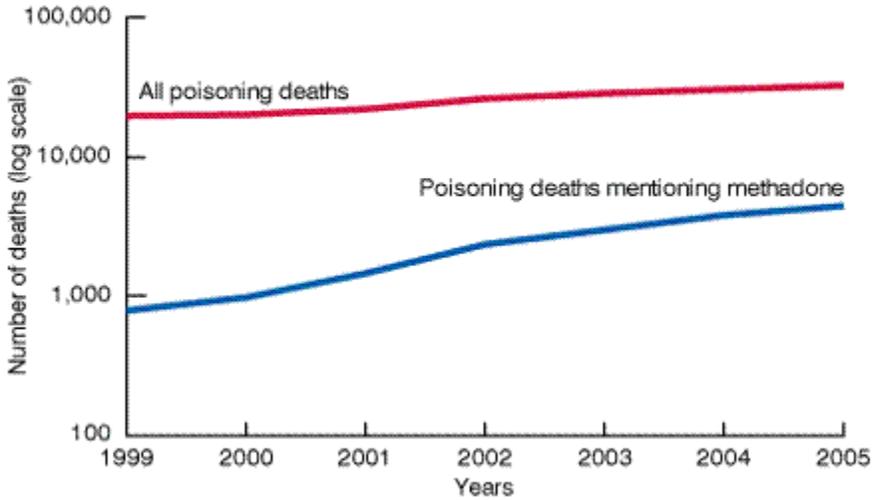
³ A significant number of deaths in West Virginia, including methadone deaths, were incorrectly classified in the 2005 final mortality file because they were still pending a final cause of death at the close of the data year. Thus, the downturn shown for West Virginia is not based on the state's final numbers.

NOTE: An unquantifiable proportion of the increase in methadone deaths is due to improvements in data collection and processing, particularly between 2001 and 2002.

SOURCE: CDC/NCHS, National Vital Statistics System.

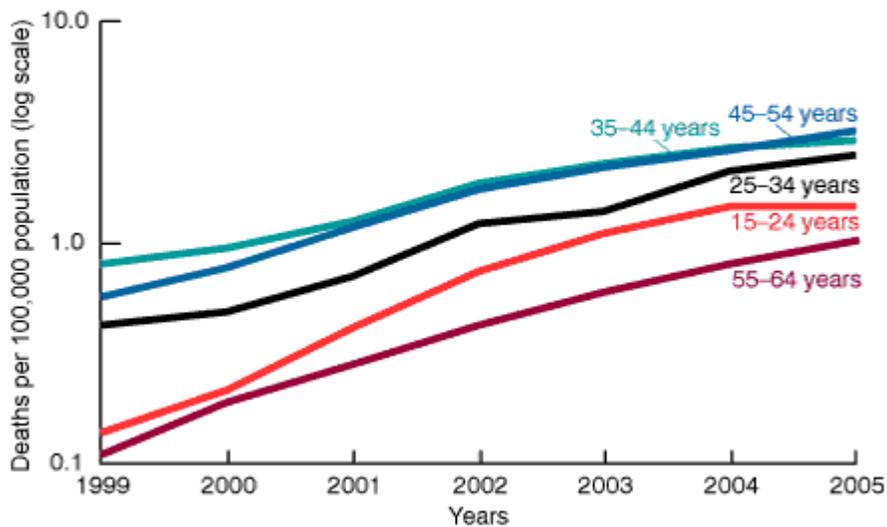
Figures

Figure 1. Poisoning and methadone-related poisoning deaths: 1999–2005



SOURCE: CDC/NCHS, data from the National Vital Statistics System.

Figure 2. Age-specific methadone-related death rates: 1999–2005



SOURCE: CDC/NCHS, data from the National Vital Statistics System.