Unintentional Poisoning Deaths in Oklahoma, 2007-2011

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Introduction

A poisoning exposure is an ingestion, inhalation, absorption, or contact with a substance resulting in a toxic effect or bodily harm. An unintentional poisoning occurs when an individual does not intend to cause harm to themselves or someone else. The individual may intentionally be exposed to a substance (e.g., a person ingests a medication at higher than prescribed levels) but does not intend to harm themselves.

Unintentional poisoning mortality rates more than doubled in the United States from 1999-2010 and increased nearly fivefold in Oklahoma during the same period. In 2010, Oklahoma had the fifth highest poisoning mortality rate in the United States (22.1 deaths per 100,000 population). In 2009, unintentional poisoning surpassed motor vehicle crashes as the leading cause of unintentional injury in Oklahoma. Unintentional poisoning is now the leading cause of injury death for Oklahomans aged 25-64.[1] The dramatic increase in unintentional poisoning deaths paralleled a marked increase in the dispensing of prescription opioid pain relievers for non-cancer pain.[2] Prescription opioid analgesics continue to be the most common substances involved in unintentional poisoning deaths.

Methods

The Office of the Chief Medical Examiner (OCME) serves as the centralized medical examiner system for Oklahoma. Oklahoma is one of 22 states with a centralized medical examiner system.[3] The Injury Prevention Service (IPS) of the Oklahoma State Department of Health (OSDH) receives reports from the OCME for all non-natural deaths occurring in Oklahoma. IPS personnel review all medical examiner reports received. Deaths with a manner of 'Accident' and mention of a poisoning in the cause of death are included as an unintentional poisoning (Table 1).

Exclusions from this definition include: adverse allergic or hypersensitivity reactions, correct drugs properly administered in therapeutic or prophylactic dosages, venomous plants and animals (other than ingestion), bacterial food poisoning, smoke inhalation, injury consequences of substance abuse (motor vehicle crashes, falls, etc.), out-of-state residents, and natural, undetermined, or intentional (e.g., suicide, homicide) manner deaths.

Data were abstracted from medical examiner reports by an epidemiologist regarding types of drugs/substances involved in the poisoning (listed in the cause of death), how

Table 1. Example Causes of Death and Inclusion/Exclusion Status

Cause of Death	Other Significant Medical Conditions	Included
Hypoxic encephalopathy due to: Complications of combined drug toxicity due to morphine, midazolam	Seizure disorder, hypothyroidism	Yes
Acute ethanol toxicity		Yes
Acute combined drug toxicity due to: tramadol, paroxetine		Yes
Probable acute methadone toxicity	Atherosclerotic cardiovascular disease	Yes
Toxic effects of 1,1-difluoroethane inhalation		Yes
Multidrug toxicity (hydrocodone, oxycodone, and alprazolam)		Yes
Head and neck injuries due to: blunt and sharp force	Drug abuse (ethanol and cocaine), thermal injury	No
Acute carbon monoxide toxicity*	Hypertension, hypercholesterolemia	No
Complications of smoke inhalation		No
Multiple gunshot wounds	Acute ethanol intoxication	No
Drowning	Methamphetamine and cocaine use	No

*Carbon monoxide toxicity due to smoke inhalation due to combustion of materials indoors

and where the injury occurred, decedent demographics, and history of substance abuse, pain, and mental health problems. Substances involved in the cause of death are classified using drug categories provided by the OCME. Data collection began in 2008 and included all unintentional poisoning deaths from calendar year 2007 forward. Data collection, abstraction, and entry are complete through 2011, and are ongoing for 2012 and 2013. Cases are crosschecked with Vital Statistics death data (ICD-10-CM underlying cause of death codes X40-X49) and the OCME annual database to ensure IPS unintentional poisoning surveillance data are as complete as possible.

Results

From 2007-2011, 3,139 Oklahomans died as a result of an unintentional poisoning (17.0 per 100,000 population). Overall, unintentional poisoning mortality rates increased 11% from 16.0 per 100,000 in 2007 to 17.7 in 2009, then decreased slightly (3%) from 2009-2011.

Adults 45-54 years of age had the highest mortality rate of any age group (37.9 per 100,000) and children 0-14 had the lowest (0.3 per 100,000). During 2007-2011, unintentional poisoning mortality rates decreased for teens and young adults aged 15-24 and adults aged 25-34 (10% and 12%, respectively). Mortality rates increased 31% for adults aged 45-54. Mortality rates for adults aged 55-64 more than doubled from 2007-2010, but decreased 22% from 2010-2011 (Table 2).

Males were more likely to die of an unintentional poisoning than females (20.6 and 13.4 per 100,000, respectively). Unintentional poisoning mortality rates increased 4% from 2007-2011 for males and 11% for females. Males had a higher mortality rate than females in all age groups except older adults (75 years and older; Figure 1). During 2007-2011, the largest increase in unintentional poisoning mortality rates for males was in the 45-64 year age group. For females, the largest increase was for adults aged 55 and older (Figure 1).

Many different substances were involved in unintentional poisoning deaths: medications (both prescription and over-the-counter), alcohol, illicit drugs (e.g., methamphetamine, cocaine, heroin, PCP, ecstasy), chemicals, and inhalants. Deaths may have included multiple substances; therefore, the number of deaths for each substance or category is not mutually exclusive. Fifty-five percent of deaths involved more than one substance. Deaths involved a mean of two substances, but ranged from one to eight substances.

Figure 1. Unintentional Poisoning Mortality Rates by Age Group and Gender, Oklahoma, 2007-2011

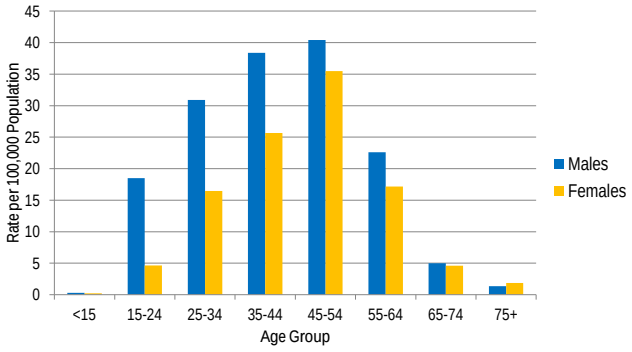


Table 2. Annual Unintentional Poisoning Mortality Rates by Gender and Age Group, Oklahoma, 2007-2011

	Total					Male					Female				
Age group	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
<15 years	0.4	0.1	0.3	0.3	0.3	0.5	0.0	0.5	0.3	0.2	0.3	0.3	0.0	0.3	0.3
15-24 years	13.7	11.7	10.4	10.9	12.4	21.8	19.3	14.7	16.4	20.2	4.8	3.5	5.8	5.0	4.2
25-34 years	25.8	23.5	23.0	24.5	22.7	32.2	33.8	26.6	32.5	29.7	19.1	12.5	19.1	16.1	15.4
35-44 years	32.6	30.2	35.6	33.4	28.5	38.0	35.0	45.3	43.0	30.7	27.1	25.5	25.8	23.6	26.3
45-54 years	32.5	40.7	39.8	34.1	42.6	34.8	42.7	43.8	38.5	42.3	30.1	38.8	36.0	29.7	42.9
55-64 years	12.8	15.5	21.9	26.8	21.0	12.6	18.5	22.0	30.9	27.5	13.1	12.8	21.7	22.9	14.8
65-74 years	3.2	3.9	6.8	5.0	4.9	3.5	2.5	9.8	4.6	4.5	3.0	5.0	4.2	5.4	5.2
75 and older	0.4	1.7	1.3	3.1	1.7	1.1	0.0	1.1	3.3	1.1	0.0	2.8	1.4	2.9	2.2
All ages	16.0	16.5	17.7	17.5	17.2	19.5	20.3	21.0	21.8	20.3	12.6	12.8	14.4	13.2	14.1

Poisoning by Non-Medication Substance

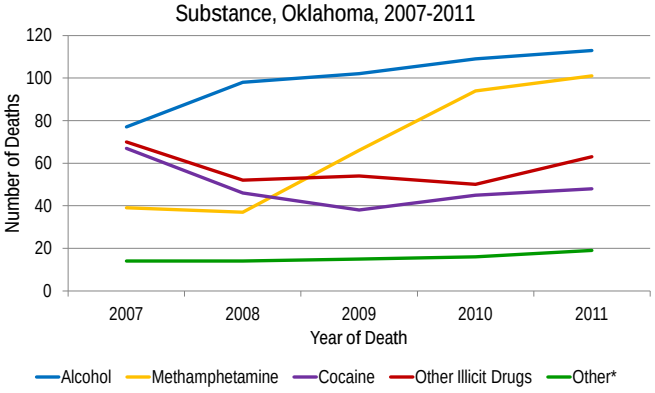
Alcohol was the most common non-medication substance involved in unintentional poisoning deaths, and 27% of those deaths involved alcohol alone. Nearly all chemical poisonings involved toluene, an industrial solvent commonly found in paint thinners, varnishes, and adhesives. Other chemicals involved included: malathion, a common pesticide; chlorine; and diethyl ether. The most common inhalants involved in unintentional poisoning deaths were carbon monoxide, 1,1-difluoroethane (canned/compressed air, refrigerant), and chlorodifluoromethane (refrigerant, Freon). Other inhalants included tetrachloroethylene, propane, butane, and mercury vapor (Table 3).

Methamphetamine was the most common illicit drug involved in unintentional poisoning deaths; more unintentional poisoning deaths involved methamphetamine than all other illicit drugs combined. Cocaine was the second most common illicit drug, and it was involved in more than six times as many deaths as heroin. Other illicit drugs included benzylpiperazine (Frenzy, Smileys, BZP, PEP pills), bromo-dragonfly, methylenedioxy-methamphetamine (ecstasy, MDMA), phencyclidine (PCP), and methylone (bath salts).

The number of unintentional poisonings involving methamphetamine nearly tripled from 2007-2011, and the number involving alcohol increased by 47% (Figure 2).

Heroin deaths may have been underestimated and misclassified as morphine. Heroin metabolizes completely into morphine; if complete toxicological analyses were delayed or not available, the specific metabolites of heroin

Figure 2. Unintentional Poisoning Deaths by Type of Non-Medication Substance, Oklahoma, 2007-2011



*Includes chemicals and inhalants due to small cell size.

Table 3. Number and Rate of Deaths Associated with Non-Medication Substances, Unintentional Poisonings (UP) Deaths, Oklahoma, 2007-2011

Substance	Number	Rate*	% of UP deaths	Male decedents (%)	Median age
Alcohol	499	2.69	15.9%	74%	44
Chemicals	18	0.09	0.6%	94%	45
Toluene	15	0.08	0.5%	93%	45
Other chemicals	3	**	0.1%	100%	43
Illicit Drugs	607	3.28	19.3%	67%	44
Methamphetamine	328	1.77	10.5%	67%	43
Cocaine	244	1.32	7.8%	66%	46
Heroin	40	0.22	1.3%	92%	30
Other illicit drugs	19	0.10	0.6%	53%	29
Inhalants	58	0.31	1.8%	67%	39
Carbon monoxide	30	0.16	1.0%	60%	52
1,1-difluoroethane	18	0.09	0.6%	71%	32
Chlorodifluoromethane	5	**	0.2%	100%	18
Other inhalants	6	0.03	0.2%	83%	45
Other substances	2	**	0.1%	50%	18
Total†	*1123*	*6.07*	*35.8%*	*71%*	*44*

*Rate per 100,000 population
**Rate not calculated due to small number.
†Deaths may have involved multiple non-medication substances; total does not reflect sum of the subcategories.

would not be identified. The medicolegal investigator assigned to each non-natural death in Oklahoma does conduct a scene investigation, so drug paraphernalia found at the time of death can inform medical examiners if deaths were likely due to heroin versus prescription morphine if full toxicological results were not available. Prescription status was known for 169 unintentional morphine overdose deaths (43%).

Poisoning by Medications

Eighty-one percent of unintentional poisoning deaths involved at least one prescription drug. The most common types of prescription drugs involved were: opioid analgesics (e.g., hydrocodone, oxycodone, methadone, morphine), anti-anxiety medications (e.g., alprazolam, diazepam, clonazepam), muscle relaxants (e.g., carisoprodol, cyclobenzaprine), antidepressants (e.g., citalopram, fluoxetine), and tricyclic antidepressants (e.g., amitriptyline, trazodone) (Tables 4, 5).

The rate of deaths involving prescription drugs was more than four times that of illicit drugs (13.71 and 3.28 per 100,000, respectively). For all unintentional poisoning

Table 5. Common Generic/Brand Name Prescription Drugs Involved in Unintentional Poisoning Deaths

Generic	Brand Name
Alprazolam	Niravam, Xanax, Xanax XR
Amitriptyline	Elavil, Endep, Vanatrip
Carisoprodol	Soma, Vanadom
Citalopram	Celexa
Clonazepam	Klonopin
Cyclobenzaprine	Amrix, Fexmid, Flexeril
Demerol	Meperidine
Diazepam	Valium
Fentanyl	Fentora, Onsolis, Duragesic patches
Fluoxetine	Prozac, Rapiflux, Sarafem, Selfemra
Hydrocodone and Acetaminophen	Hycet, Liquicet, Lorcet, Lortab, Norco, Polygesic, Vicodin
Hydromorphone	Dilaudid
Methadone	Diskets, Dolophine, Methadose
Morphine	Avinza, Kadian, MS Contin, MSIR, Roxanol
Oxycodone	OxyContin, Oxyfast, Percolone, Roxicodone
Oxycodone and Acetaminophen	Endocet, Oxycet, Percocet, Roxicet, Roxilox, Tylox
Oxymorphone	Opana
Propoxyphene	Darvocet, Darvon, Darvon-N, PP-Cap
Tramadol	Rybix, Ryzolt, Ultram
Venlafaxine	Effexor
Zolpidem	Ambien, Edluar, Intermezzo, Zolpimist

Table 4. Number and Rate of Deaths Associated with Medications by Medication Type, Unintentional Poisonings Deaths, Oklahoma, 2007-2011

Medication Type	Number	Rate*	% of UP deaths	Male decedents (%)	Median age
Prescription medication	2535	13.71	80.8%	57%	43
Opioid analgesic	2216	11.98	70.6%	58%	43
Anti-anxiety	835	4.52	26.6%	60%	42
Muscle relaxant	251	1.36	8.0%	46%	44
Antidepressant	219	1.18	7.0%	41%	47
Tricyclic antidepressant	155	0.84	4.9%	41%	46
Non-opioid analgesic	142	0.77	4.5%	39%	43
Antipsychotic	40	0.22	1.3%	43%	43
Respiratory	38	0.21	1.2%	33%	44
Hypnotic/sedative	29	0.16	0.9%	55%	44
Antiemetic	28	0.15	0.9%	25%	47
CNS stimulant	22	0.12	0.7%	45%	43
Other**	50	0.27	1.6%	35%	46
Over-the-counter medications	114	0.62	3.6%	28%	43
Total†	*2554*	*13.81*	*81.4%*	*57%*	*43*

*Rate per 100,000 population
**Includes cardiovascular, anticonvulsant, anticholinergic, anesthetic, diabetes, antimanic, and unknown medications
†Deaths may have involved multiple non-medication substances; total does not reflect sum of the subcategories.

deaths, men had higher mortality rates than women for all age groups except older adults aged 75 years and older. For poisoning deaths involving at least one prescription drug, women aged 45-54 and 65 years and older had higher mortality rates than men. Overall, the most common prescription drugs involved in unintentional poisoning deaths were hydrocodone, oxycodone, alprazolam, methadone, and morphine (Figure 3). The most common opioids dispensed in Oklahoma during the same time period were methadone, hydrocodone, oxycodone, fentanyl, and morphine. The amount of morphine equivalent kilograms of hydrocodone, oxycodone, and morphine dispensed increased more than 30% from 2007-2011 (36%, 32%, and 40%, respectively). Methadone and fentanyl dispensation also increased during the same time period (5% and 9%, respectively), but decreased from 2010-2011 (Figure 4).

Seventy-one percent of all unintentional poisoning deaths involved at least one opioid analgesic (e.g., hydrocodone, oxycodone, and methadone). More deaths involved hydrocodone or oxycodone than alcohol, methamphetamine, cocaine, heroin, and all other illicit drugs combined (Figure 5).

Decedents whose deaths involved at least one prescription drug had, on average, twice as many substances listed in the cause of death compared to decedents whose deaths did not involve prescription drugs (mean number of substances were 2.2 and 1.1, respectively). More than three-fourths (78%) of substances involved in unintentional poisoning deaths were prescription drugs (Figure 6).

Combinations of Substances

Seventy-one percent of unintentional poisoning deaths involved at least one opioid analgesic, and 30% (n=941) involved opioid analgesics alone. Of deaths involving only opioid analgesics, 79% involved one opioid analgesic and 21% involved more than one (range: 2-5). The most common substances involved with opioid analgesics were anti-anxiety medications (33%), other medications (19%), alcohol (11%), illicit drugs (9%), and antidepressants (9%).

Twenty-seven percent of unintentional poisoning deaths involved an anti-anxiety medication, but less than 1% (n=23) involved anti-anxiety medications alone. Nearly 90% (n=728) of anti-anxiety medication-related

Figure 3. Five Most Common Substances Involved in Unintentional Poisoning Deaths, Oklahoma, 2007-2011

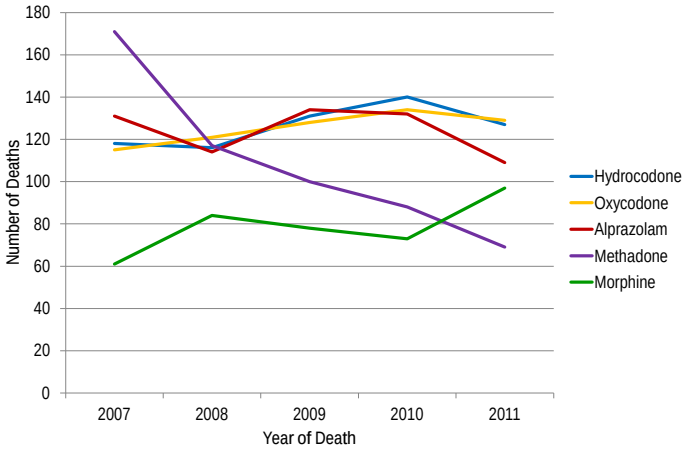


Figure 4. Rate of Opioid Sales by Year in Morphine Equivalent Kilograms for Most Common Opioids Sold,[2,8] Oklahoma, 2007-2011

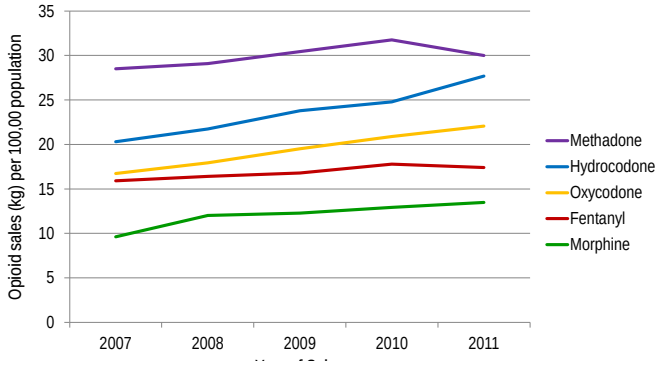
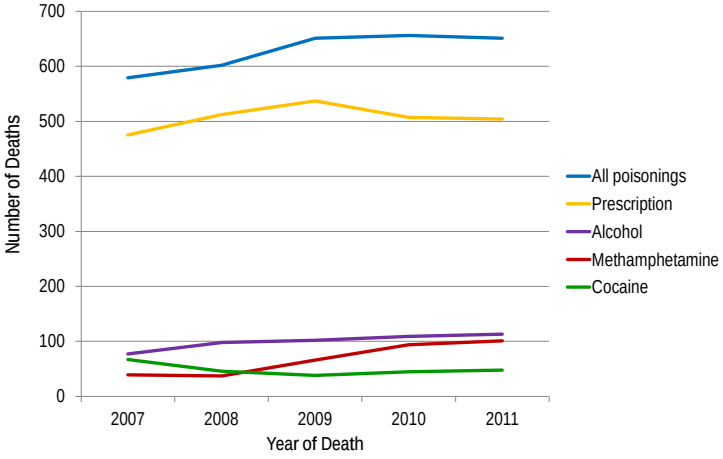


Figure 5. Unintentional Poisoning Deaths Involving Prescription Drugs, Illicit Drugs, or Alcohol by Year of Death, Oklahoma, 2007-2011



unintentional poisoning deaths also involved an opioid analgesic. Other common substances involved with anti-anxiety medications were alcohol (13%), antidepressants (11%), illicit drugs (10%), and other medications (28%).

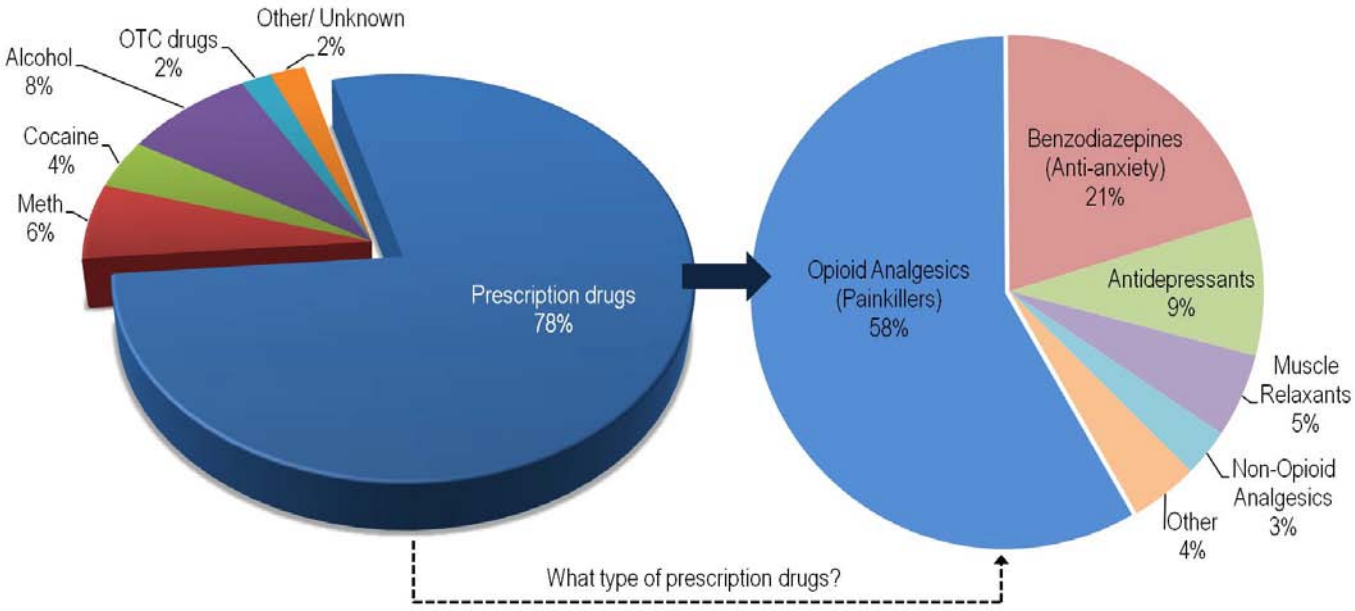
Fifty-six percent of illicit drug-related unintentional poisoning deaths involved only illicit drugs, compared to 27% of unintentional alcohol poisoning deaths that involved only alcohol. One-third of illicit drug-related deaths also involved an opioid analgesic, compared to nearly half (48%) of unintentional alcohol poisoning deaths. Thirteen percent and 22% of illicit drug and alcohol unintentional poisoning deaths involved an anti-anxiety medication, respectively.

Autopsy/Toxicology

An autopsy was performed on 54% (n=1683) of decedents, a rate nearly five times that of *all deaths* certified by the OCME during the same time period (12%). Unintentional poisoning deaths were also more likely to undergo an autopsy by a medical examiner compared to *all non-natural deaths* (54% and 33%, respectively, Table 6). Male decedents were more likely to undergo an autopsy compared to female decedents (57% and 48%, respectively). The percent of unintentional poisoning decedents autopsied decreased with age. Ninety-six percent of decedents aged 0-34 years underwent an autopsy, compared to 65% of adults aged 35-44 and 22% of adults aged 45 and older. Nationally, 76% of unintentional poisoning deaths underwent an autopsy. From 2007-2010, Oklahoma ranked 44th in the nation for the percentage of unintentional poisoning deaths that underwent an autopsy. Oklahoma has lower percentages of decedents autopsied compared to other states. Oklahoma was one of seven states to autopsy less than 25% of suicide decedents, and one of three states to autopsy less than 50% of undetermined manner deaths.[4]

Ninety-six percent (n=3027) of decedents had a toxicology report for ethyl alcohol, compared to 22% of all deaths certified by the OCME and 61% of all non-natural deaths. Although 499 decedents had alcohol listed as part of the cause of death, 785 decedents (25%) were definitely/likely drinking alcohol prior to their deaths (positive result for ethyl alcohol in toxicology results or a mention of recent alcohol use elsewhere in the medical examiner's report).

Figure 6. Substances* Involved in Unintentional Poisoning Deaths, Oklahoma, 2007-2011



*Percentages were calculated using the total number of substances involved in UP deaths (n=6,152). Deaths may have involved multiple types of one substance and/or multiple types of substances (e.g., death due to multiple opioid analgesics, a benzodiazepine, and alcohol).

The median ethyl alcohol level for decedents who were definitely/likely drinking before their death was 0.10 g/dL (range: 0.00-0.88 g/dL). Decedents whose deaths involved at least one prescription drug were less likely to drink alcohol prior to death (22%). Decedents whose deaths involved no prescription drugs were much more likely to drink alcohol prior to death (37%).

Childhood Poisoning

From 2007-2011, there were 38 unintentional poisoning deaths to children under 18 years of age. Seventy-four percent (n=28) of childhood poisoning deaths were teens aged 15-17.

Seventy-four percent (n=28) of childhood unintentional poisoning deaths involved at least one prescription drug, and two-thirds (n=25) involved at least one opioid analgesic. Other common substances involved in childhood poisoning deaths were alcohol (n=4), anti-anxiety medications (n=6), illicit drugs (n=5), and inhalants (n=4).

Table 6. Unintentional Poisoning Surveillance Findings by Medication Involvement, Oklahoma, 2007-2011

	All UP		No Rx meds		At least one Rx med	
	N	%	N	%	N	%
Autopsy	1683	54%	323	54%	1360	54%
Alcohol use prior to death (definite/likely)	785	25%	225	37%	560	22%
Death occurred at a residence	2135	68%	324	54%	1811	71%
History of overdose	310	10%	16	3%	294	12%
History of pain	988	31%	46	8%	942	37%
Attended drug rehab/therapy	145	5%	16	3%	129	5%
Contact with medical profession in prev. 3 months	1051	34%	107	18%	940	37%
Snoring loudly/breathing slowly	317	10%	23	9%	294	16%
Current or past substance use/abuse	1939	62%	379	63%	1560	62%
Alcohol	571	30%	164	43%	408	26%
Prescription drugs	1042	54%	46	12%	996	64%
OTC drug and other substances of abuse (e.g., spray paint)	37	2%	31	8%	6	<1%
Illicit drugs	491	25%	180	48%	311	20%
Unspecified drug	386	20%	60	16%	326	21%
Current or past mental health problem	1051	34%	84	14%	967	38%
Depression/bipolar disorder	752	72%	47	56%	705	73%
Schizophrenia	54	5%	7	8%	47	5%
Suicide attempt/ideation	261	25%	19	23%	196	24%
Post-traumatic stress disorder	28	3%	3	4%	25	3%
Anxiety disorder	172	16%	6	7%	166	17%
Panic disorder	5	<1%	0	0%	5	<1%
Other/unspecified problem	128	12%	18	21%	110	11%
Total	3139	100%	604	100%	2535	100%

Supplemental Surveillance Information

Decedents whose deaths involved at least one prescription drug were twice as likely to have had contact with the medical profession in the three months preceding their death compared to decedents with no prescription drugs involved (37% and 18%, respectively).

Forty-five percent of decedents whose deaths involved prescription drugs had a prescription for at least one of the drugs involved in the death. Sixteen percent of decedents did not have a prescription for at least one of the drugs involved in the death (medical examiner report indicated decedent bought it on the street, on the internet, or took it from a friend or relative). Prescription status was unknown for all drugs involved for 41% of decedents. The IPS does not have access to a patient's prescription history other than what is documented in the medical examiner report.

Overall, nearly all *injuries* (91%, n=2840) occurred at a home, and 80% (n=2504) of decedents' injuries occurred at their own home. More than two-thirds (68%, n=2135) of *deaths* occurred in a home, and 26% (n=820) of deaths occurred in a hospital. Two percent (n=65) of deaths occurred in a hotel/motel. Prescription drug-related deaths were more likely to occur in a home compared to deaths not involving prescription drugs (71% and 54%, respectively).

An estimated 22% of adults in Oklahoma have a diagnosable mental illness.[5] Reports for one-third (n=1051) of decedents mentioned a current or past mental health problem. Decedents whose deaths involved at least one prescription drug were over 2.5 times as likely to have a current or past mental health problem as decedents whose deaths did not involve prescription drugs (38% and 14%, respectively).

Thirty-one percent (n=988) of decedents had a documented history of pain (i.e., chronic pain, problems with pain/pain management, or a history of pain). Decedents whose deaths involved at least one opioid were five times as likely to have a history of pain compared to decedents whose deaths did not involve prescription drugs (39% and 8%, respectively).

Ten percent (n=310) of decedents had a history of an overdose. Decedents whose deaths involved at least one prescription drug were more likely to have had mention of a previous overdose (12% and 3%, respectively) compared to deaths with no prescription drugs involved. Five percent (n=145) of decedents had attended drug rehab/therapy.

More than half (62%, n=1939) of decedents had a current or past substance abuse problem (including problems with using or abusing drugs, alcohol, and/or other substances). Decedents whose deaths did not involve prescription drugs were most likely to have a substance abuse problem involving alcohol or illicit drugs. However, decedents whose deaths involved prescription drugs were more likely to have a substance abuse problem involving prescription drugs.

Snoring loudly or breathing slowly (agonal respirations) are a common sign of respiratory distress. Among decedents who were not alone at the time of death (i.e., someone was in the home with them), snoring loudly or breathing slowly was more commonly reported prior to deaths involving prescription drugs compared to deaths with no prescription drugs involved (16% and 9%, respectively).

Unintentional poisoning mortality rates varied by county of residence. The highest rates were in the eastern and southern areas of Oklahoma. The lowest rates were in the northwestern area of the state (Figure 7). Counties with the highest mortality rates were (in order): Pawnee, Pontotoc, Creek, Muskogee, and Johnston. Pawnee County had the highest unintentional poisoning mortality rate, more than 30% higher than the second highest rate (36.2 per 100,000 compared to 27.5 per 100,000).

Limitations

By collecting mortality data only, this study underestimates the true burden of poisoning injury in Oklahoma. More than 4,000 Oklahomans are hospitalized each year for an unintentional poisoning; many more are treated and released from an emergency room, by emergency medical services (EMS), or by a primary care physician, or do not seek any medical attention.

This study includes unintentional poisoning deaths, but excludes intentional (suicide, homicide) and undetermined manner deaths. From 2007-2010, unintentional manner poisoning deaths accounted for more than 80% of all poisoning deaths in Oklahoma; undetermined manner deaths accounted for 5-8% of poisoning deaths, and suicide 9-14%.[1]

Decedent history (mental health, substance use/abuse, medical, etc.) was abstracted from the OCME Report of Investigation and was limited to the results of the medicolegal investigator's findings. The findings of the medicolegal investigator are limited to scene reporting by friends, family, law enforcement, or EMS and any follow up information that might be obtained from the decedent's physician(s). These estimates are likely underreported, especially for substance abuse and mental health history. A decedent's family may have been unlikely to report current/past problems. A decedent may have been under the supervision of multiple physicians, and health histories might have been incomplete.

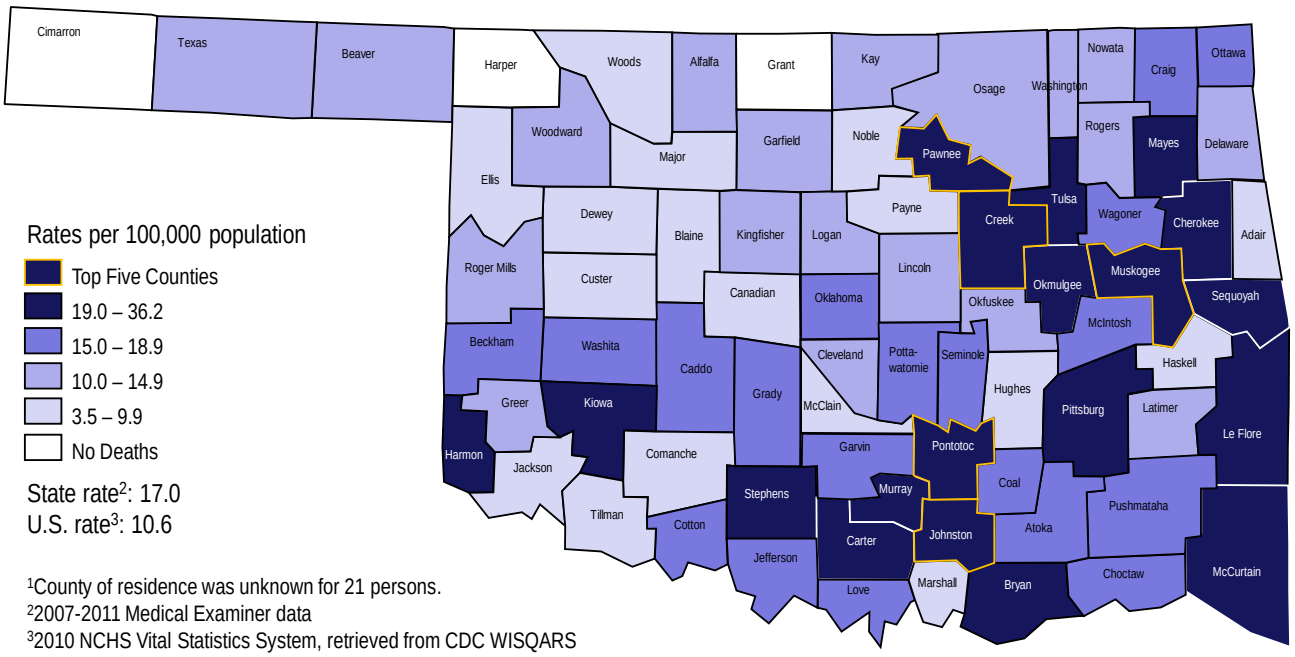
This study included only Oklahoma residents who died within the state. Resident deaths outside of Oklahoma or out-of-state residents that died in Oklahoma were excluded.

Prescription drug monitoring programs are a promising intervention to prevent diversion of prescription drugs and to assist practitioners in appropriate prescribing decisions.[6] Oklahoma has a nationally-recognized, real-time prescription monitoring program (PMP). The OSDH is not currently approved to access the PMP data, and the IPS was not able to link medical examiner-reported deaths to PMP records. This linkage would provide a more accurate prescription history as well as identification of decedents with a history of opioid analgesic use versus opioid analgesic-naïve patients.

Conclusion

Unintentional poisoning deaths have increased dramatically since the late 1990s, both in Oklahoma and the United States. Oklahoma has one of the highest unintentional poisoning rates in the United States. In general, in Oklahoma from 2007-2011, men were more likely than women to die of an unintentional poisoning, and mortality rates were highest among adults 35-54 years of age. Women aged 45-54 years and 65 and older had higher rates of unintentional prescription drug-related poisoning mortality than men.

Figure 7. Unintentional Poisoning Death Rates by County of Residence[1], Oklahoma, 2007-2011



[1]County of residence was unknown for 21 persons.
[2]2007-2011 Medical Examiner data
[3]2010 NCHS Vital Statistics System, retrieved from CDC WISQARS

Of the five most common substances involved in unintentional poisoning deaths in Oklahoma from 2007-2011, all were prescription drugs, and four of the five were opioid analgesics. Oklahoma is one of the leading states in prescription painkiller sales.[7] From 2007-2011, Oklahoma had the sixth-largest distribution of hydrocodone per capita in the United States, nearly 25,000 grams per 100,000 population.[7]

This study supports previous research that indicated an increased risk of overdose death for individuals with a history of mental illness, chronic pain, and/or substance abuse.[9]

Prescription Drug Planning Workgroup

In September 2012, the Prescription Drug Planning Workgroup was commissioned by the Oklahoma Prevention Leadership Collaborative, as a Governor's initiative, to develop a state plan to reduce prescription drug abuse in Oklahoma. The workgroup includes members from multiple state agencies and stakeholders, including:

- Oklahoma State Department of Health
- Oklahoma Department of Mental Health and Substance Abuse Services
- Oklahoma Bureau of Narcotics and Dangerous Drugs Control
- State regulatory boards
- Oklahoma Hospital Association
- Oklahoma Health Care Authority (state Medicaid agency)
- Other public safety and law enforcement agencies
- Other education and health agencies

The workgroup created a state plan, *Reducing Prescription Drug Abuse in Oklahoma*. The plan includes seven recommended focus areas and associated commitments to action at the state and community levels (examples in Table 7). The recommended focus areas include community/public education; provider/prescriber education; disposal/storage of medication, for the public and for providers; tracking and monitoring of prescriptions; regulations and enforcement; and treatment/interventions. Each commitment to action includes an expected date of completion and a responsible party.

Table 7. Selected Statewide Commitments to Action from *Reducing Prescription Drug Abuse in Oklahoma*

<table>
<tr>
<td>Community/Public Education
- Statewide comprehensive media campaign
- Create and deliver educational presentations on prescription drug abuse consequences and prevention
- Encourage the Certified Healthy Oklahoma Programs to add prescription drug abuse to application criteria</td>
<td>Provider/Prescriber Education
- Develop curriculum to educate health care students on prescribing practices and diversion
- Develop and require overdose prevention training curriculum completion to obtain prescribing authority for controlled substances
- Develop and promote opioid prescribing guidelines
- Promote policies that discourage drug-seeking/doctor-shopping behavior</td>
</tr>
<tr>
<td>Disposal/Storage for the Public
- Increase number of medication disposal drop boxes (at least one in each county)
- Create a website with drop box locations and proper use information
- Provide proper medication storage information to patients, including the use of lock boxes</td>
<td>Disposal/Storage for Providers
- Establish a medication disposal unit under a law enforcement agency
- Dedicate resources to develop and administer training curriculum for non-prescribing staff on appropriate storage, transfer, and disposal of medications</td>
</tr>
<tr>
<td>Tracking and Monitoring
- Enhance PMP to identify trends and reduce fraud
- Increase use of the PMP by prescribers
- Examine required provider PMP queries
- Share record level de-identified PMP, Medicaid, and other state payer source data for research purposes</td>
<td>Regulatory/Enforcement
- Prevention of opioid deaths and diversions selected as a state priority by Governor’s office
- Limit the number of hydrocodone refills
- Increase number of CLEET-certified investigators on regulatory boards
- Review, strengthen, and expand lock-in programs by prescription claim payers</td>
</tr>
<tr>
<td colspan="2">Treatment/Interventions
- Implement and evaluate a pilot naloxone program
- Promote a registry of assessment/treatment service providers
- Conduct a statewide needs assessment on substance abuse treatment options
- Increase funding and expand use of community-based services for treatment
- Increase Screening, Brief Intervention, and Referral to Treatment (SBIRT) by primary care and ED providers
- Establish “Good Samaritan” legislation
- Establish legislation to authorize dispensing of naloxone to family members, first responders, etc.</td>
</tr>
</table>

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