



HHS Public Access

Author manuscript

Inj Prev. Author manuscript; available in PMC 2022 June 10.

Published in final edited form as:

Inj Prev. 2019 December ; 25(6): 577–580. doi:10.1136/injuryprev-2018-043104.

Drug Overdose Deaths at Work, 2011–2015

Hope M. Tiesman, PhD,

National Institute for Occupational Safety and Health, Division of Safety Research, Analysis and Field Evaluations Branch, Morgantown, WV

Srinivas Konda, MPH,

National Institute for Occupational Safety and Health, Division of Safety Research, Analysis and Field Evaluations Branch, Morgantown, WV

Lauren Cimineri, PharmD MPH,

National Institute for Occupational Safety and Health, World Trade Center Health Program, Washington, DC

Dawn N. Castillo, MPH

National Institute for Occupational Safety and Health, Division of Safety Research, Morgantown, WV

Abstract

Background: Drug overdose fatalities have risen sharply. The impact on U.S. workplaces has not been described.

Purpose: The purpose of this article is to enumerate and describe overdose deaths of workers while at work in U.S. workplaces between 2011 and 2015.

Methods: Drug overdose deaths at work were identified from the Census of Fatal Occupational Injuries database. Overdose fatality rates were calculated using denominators from the Current Population Survey. Fatality rates were compared among demographic groups with rate ratios and 95% Confidence Intervals (CIs). Industry-specific fatality rates were calculated. Negative binomial regression was used to analyze temporal trends.

Results: Between 2011 and 2015, 543 drug overdose deaths occurred among workers at U.S. workplaces, for a fatality rate of 0.8 per 1,000,000 full-time equivalents (FTEs). Workplace overdose deaths significantly increased, on average, 23% annually across the 5-year period ($p < 0.0001$). Workplace overdose fatality rates were highest for men (1.19 per 1,000,000 FTE) and those in the mining, transportation and warehousing, and construction industries (2.9, 2.4, and 1.8, respectively). Thirty-two percent of workplace overdose fatalities came from workplaces with less than 10 employees ($n=174$). Heroin ($n=118$, 22%) was the single most frequent drug documented in workplace overdose deaths.

Corresponding Author: Hope M. Tiesman, PhD, NIOSH, Division of Safety Research, 1095 Willowdale Road, M/S 1811, Morgantown, WV 26506, Phone: (304) 285-6067, Fax: (304) 285-6235, htiesman@cdc.gov.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

The authors of this manuscript do not have any conflicts of interest. The authors of this manuscript have no financial disclosures.

Conclusions: While workplace overdose deaths were low, they increased considerably, signaling that workplaces are also impacted by the national opioid overdose epidemic. Programmatic efforts should focus on the most affected industries and keep the needs and challenges of small businesses in mind. More research is needed on the most effective employer-based interventions.

Keywords

overdoses; workplace; surveillance

Introduction

The U.S. opioid overdose epidemic is ongoing. Drugs involved in these deaths include prescribed opioids and illicit use of prescription opioids, heroin, and fentanyl. In 2016, the age-adjusted drug overdose death rate was three times the 1999 rate (19.8 per 100,000 standard population versus 6.1) (1). In 2016, 66% of drug overdose deaths involved an opioid (1). It is unclear how this epidemic is impacting workers and employers. Opioids may be prescribed or used as a result of an occupational injury (2,3). Use of prescription or illicit opioids may negatively impact work tasks such as driving or operating heavy machinery, potentially causing injury (2, 3). The purpose is to enumerate and describe overdose deaths of workers, including those involving opioids, that occurred in U.S. workplaces between 2011 and 2015.

Methods

Drug overdose deaths in U.S. workplaces between 2011 and 2015 were identified from the most recent data from the Bureau of Labor Statistics' (BLS) Census of Fatal Occupational Injuries (CFOI) database. BLS compiles data on all work-related fatalities occurring to non-institutionalized people while on the premises of their employer or working off-site using multiple administrative and public records. Denominator data for rate calculations were obtained from the BLS's Current Population Survey (CPS). CPS is an annual survey of 60,000 civilians aged 15 years or older who are non-institutionalized wage and salary workers, self-employed, part-time workers, or unpaid workers in family-oriented enterprises to create national workforce estimates (4).

Overdose fatalities were identified using Occupational Injury and Illness Classification System primary and secondary injury source codes: '1840' (Drugs, alcohol, medicines, unspecified), '1842' (Drugs—nonmedicinal), '1843' (Medicines, except vaccines), '1848' (Multiple drugs, alcohol, medicines), and '1849' (Drugs, alcohol, medicines, n.e.c.) (5). These methods assume that if drugs were identified as a primary or secondary injury source, the fatality was from overdose. No deaths were solely due to alcohol. Major industry groups were defined using the 2002 North American Industrial Classification System (NAICS) codes (6). Narrative text fields were used to categorize the type of drug associated with the fatality into five categories: 'Illicit drugs' such as methamphetamines, PCP, narcotics, cocaine, and heroin; 'Opioids-not-including-heroin' such as fentanyl, morphine, oxycodone, and codeine; 'Other' which included all types of prescription drugs, amphetamines, and

benzodiazepines; 'Multiple Drug' when the narrative text was limited to the term multiple drug; and 'Unknown' when no particular drug was listed. Heroin, while pharmaceutically an opioid, was included in the illicit drug category because a feature of this analysis was the role of illicit substances in the workplace. Due to a lack of detail in the narrative text, the authors were unable to determine whether the drugs associated with the fatality were obtained legally.

Analyses were performed with SAS, version 9.2 in 2018. Overdose fatality rates were calculated as the total number of overdose deaths divided by the estimated number of workers and expressed as number of fatalities per 1,000,000 full-time equivalent (FTE) workers. Socio-demographics of the decedent and workplace characteristics were compared with rate ratios (RRs) and 95% Confidence Intervals (CIs). Fatality rates were calculated for major industries. Negative binomial regression was used to assess trends in drug overdose fatality rates.

Results

Between 2011 and 2015, 543 drug overdose deaths occurred in U.S. workplaces, resulting in a fatality rate of 0.8 per 1,000,000 FTEs (Figure 1, Table 1). The annual workplace overdose fatality rate decreased from 2011 to 2012, then increased annually until 2015, resulting in a 23% (95% CI = 16% - 31%) increase annually across the 5-year period. This was in contrast with the all-cause workplace fatality rate which decreased 0.8% (95% CI = -1.9% -0.3%) during the same period, albeit non-significantly ($p=0.1668$). Men had significantly higher workplace overdose fatality rates than women (RR=4.4, 95% CI=3.4-5.5) (Table 1). Nearly one-third of workplace overdose fatalities came from workplaces with less than 10 employees ($n=174$, 32%). Workplace overdose fatality rates were highest in the midwestern and western regions of the U.S (0.88/1,000,000 FTEs).

The three industries with the highest number of workplace overdose fatalities were construction, transportation & warehousing, and healthcare & social assistance ($n=83$, $n=77$, $n=73$) (Table 1). The three industries with the highest overdose fatality rates were mining, transportation & warehousing, and construction (2.9/1,000,000 FTEs; 2.4; 1.8). The largest category of drugs used in workplace overdose deaths was illicit drugs ($n=320$, 45%), followed by opioids ($n=159$, 22%) (Table 2). Heroin was the single most frequent drug associated with workplace overdose deaths ($n=118$, 22%) (data not shown). When heroin is included within the opioid category, opioids become the largest category of drugs in workplace overdose deaths (277, 39%), followed by illicit drugs (202, 28%).

Discussion

This study used a well-established occupational surveillance system to describe workplace overdose deaths. While the workplace overdose fatality rate was low, there was a significant increase in the number and rate of overdose deaths over the five-year period. There were several noteworthy findings. Nearly 50% of workplace overdose deaths occurred in three industries – construction, transportation & warehousing, and healthcare & social assistance. Nearly one-third of workplace overdose deaths occurred in businesses with less than 10

employees. Also, these findings mirror trends outside the workplace that demonstrate the increasing role of heroin in overdose deaths (7). This has implications for the development and dissemination of prevention programs, messages, and strategies.

These findings correspond to theories on the social and economic determinants of the opioid crisis (8). Dasgupta et.al. suggest that the most profitable jobs in poor communities are those with elevated physical hazards that may increase risk of on-the job injuries and chronic musculoskeletal conditions (8). These medical events could lead to prescription opioid use for the injury and later misuse (8). Indeed, construction and transportation & warehousing occupations can be physically demanding. While healthcare workers are not normally seen as high-risk for drug misuse, studies have found that due to the ease of drug access, misuse may be more common than what has been reported (9,10).

Regarding limitations, CFOI likely underestimates workplace overdose deaths because there had to be evidence, such as drug paraphernalia, for post-mortem drug testing to be performed. Also, the degree of bias within the naming of the drugs associated with the fatality is unknown. Fentanyl was included in the ‘opioid’ category due to our inability to determine the source of the fentanyl. Since there has been an increase in overdose deaths involving illicitly-manufactured fentanyl, our illicit drug category may be an underestimate (7).

The role of the workplace in the prevention of drug overdoses is uncertain. While workplace-based drug testing is commonplace, there is not strong evidence that drug testing improves workplace safety (11). Traditional drug tests do not test for some commonly abused prescription drugs and, if they did, separating those that misuse drugs from those using drugs prescribed for legitimate medical purposes would be important (12). The Substance Abuse and Mental Health Services Administration and the National Safety Council provide information and resources to employers on how to address prescription drug use and misuse in the workplace (13,14). Also, any programmatic effort must consider small businesses in addressing worker safety and health (15). More research is needed to understand the impact of the epidemic on workplaces and the most effective employer-based interventions.

References

1. Hedegaard H, Warner M, Minino AM. Drug Overdose deaths in the United States, 1999–2016. NCHS Data Brief 2017(294). <https://www.cdc.gov/nchs/data/databriefs/db294.pdf>.
2. Kowalski-McGraw M, Green-McKenzie J, Pandalai SP, Schulte I Characterizing the interrelationships of prescription opioid and benzodiazepine drugs with worker health and workplace hazards. *J Occup Environ Med.* 2017; 59(11): 1114–1126. [PubMed: 28930799]
3. Castillo D and Howard J. (2015). The Opioid Overdose Epidemic and the Workplace. Centers for Disease Control and Prevention Website. <https://blogs.cdc.gov/niosh-science-blog/2015/12/21/opioid-overdose/> Published December 21, 2015. Accessed May 17, 2018.
4. U.S. Bureau of Labor Statistics. BLS Handbook of Methods. Chapter 1: Labor Force Data derived from the Current Population Survey. Washington, DC: U.S Department of Labor. www.bls.gov/opub/hom/homch1.pdf.
5. U.S. Bureau of Labor Statistics. Occupational Injury and Illness Classification Manual. U.S. Department of Labor, Washington, DC; 1992.

6. Office of Management and Budget. North American industry classification system. Brenan Associates, Lanham MD; 2002.
7. O'Donnell JK, Gladden RM, Seth P. Trends in deaths involving heroin and synthetic opioids excluding methadone, and law enforcement drug product reports, by census region - United States, 2006–2015. *MMWR Morb Mortal Wkly Rep* 2017; 66: 897–903. [PubMed: 28859052]
8. Dasgupta N, Beletsky L, Ciccarone D. Opioid crisis: No easy fix to its social and economic determinants. *Am J Public Health*. 2018; 108(2): 182–186. [PubMed: 29267060]
9. Pilgrim JL, Dorward R, Drummer OH. Drug-caused deaths in Australian medical practitioners and health-care professionals. *Addiction*. 2017; 112(3): 486–493. [PubMed: 27866392]
10. Meeker JE, Mount AM, Ross W. Detection of drug abuse by health professionals. *Occup Health Saf*. 2002; 71(8):46–50. [PubMed: 12197441]
11. Pidd K and Roche AM. 2014. How effective is drug testing as a workplace safety strategy? A systematic review of the evidence. *Accid Anal Prev*. 71: 154–165. [PubMed: 24922614]
12. Powell A September 2013. Prescription for a hazardous workplace. *Occup Health Saf*. 82(9): 90–91.
13. Substance Abuse and Mental Health Services Administration. Drug-free workplace programs. <https://www.samhsa.gov/workplace> Accessed May 17, 2018.
14. National Safety Council. Prescription Drug Employer Kit. <http://www.nsc.org/learn/NSC-Initiatives/Pages/prescription-drug-employer-kit.aspx>. Accessed May 17, 2018.
15. Centers for Disease Control and Prevention. Small business – understanding small business challenges. <https://www.cdc.gov/niosh/topics/smbus/challenges.html> Updated July 14, 2016. Accessed May 17, 2018.

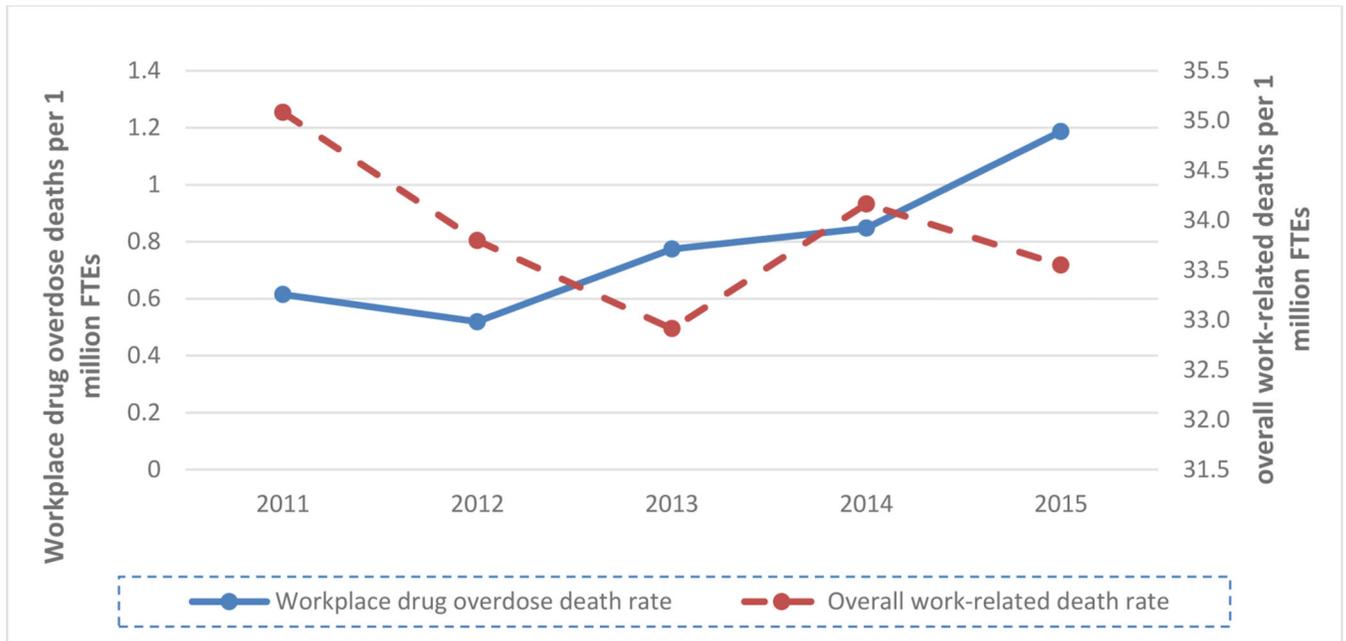


Figure 1. Rate of Workplace Overdose Deaths and Overall Workplace Deaths by Year: CFOI 2011–2015*

*Drug overdose fatality rate and overall work-related fatality rate on two different scales

Note: Totals and rates were generated by the authors with restricted access to CFOI microdata.

Table 1.

Sociodemographic and Industry of Workplace Overdose Fatalities: CFOI 2011–2015

	Number	%	Workers at Risk	Rate per 1,000,000 FTE	RR (95% CI)
Gender					
<i>Male</i>	463	85	388,235,843	1.19	4.4 (3.4–5.5)
<i>Female</i>	80	15	296,094,683	0.27	1.0
Age Group (years)					
<i>16–24</i>	40	7	69,713,660	0.57	1.0 (0.6–1.3)
<i>25–34</i>	145	27	153,676,920	0.94	1.6 (1.2–2.0)
<i>35–44</i>	141	26	153,391,290	0.92	1.6 (1.1–2.0)
<i>45–54</i>	132	24	163,660,367	0.81	1.4 (0.9–1.7)
<i>55 and older</i>	85	16	143,888,290	0.59	1.0
Hispanic					
<i>Non-Hispanic</i>	479	88	578,309,481	0.83	1.4 (1.0–1.5)
<i>Hispanic</i>	63	12	106,021,045	0.59	1.0
Race					
<i>White</i>	449	83	550,452,505	0.82	1.2 (0.9–1.4)
<i>Non-White</i>	94	17	133,878,020	0.70	1.0
Size of Establishment (# of employees)					
<i>1–10</i>	174	32	NA	NA	NA
<i>11–19</i>	44	8	NA	NA	NA
<i>20–49</i>	58	11	NA	NA	NA
<i>50–99</i>	28	5	NA	NA	NA
<i>100 and more</i>	107	20	NA	NA	NA
Region					
<i>Northeast</i>	97	18	123,485,280	0.79	1.0
<i>Midwest</i>	133	25	151,035,026	0.88	1.1 (0.8–1.4)
<i>South</i>	176	32	254,128,846	0.69	0.7 (0.7–1.1)
<i>West</i>	137	25	155,681,374	0.88	1.1 (0.8–1.4)
Industry *					
<i>Construction</i>	83	15	46,294,839	1.79	-
<i>Transportation & Warehousing</i>	77	14	31,827,210	2.42	-
<i>Healthcare & Social Assistance</i>	73	13	90,034,319	0.81	-
<i>Administrative & Support & Waste Management</i>	47	9	29,509,114	1.59	-
<i>Accommodation & Food Services</i>	45	8	42,918,319	1.05	-
<i>Manufacturing</i>	39	7	78,194,047	0.50	-
<i>Retail Trade</i>	37	7	72,898,241	0.51	-
<i>Other Services</i>	33	6	31,565,685	1.05	-
<i>Arts, Entertainment, Recreation</i>	19	4	12,590,630	1.51	-

	Number	%	Workers at Risk	Rate per 1,000,000 FTE	RR (95% CI)
<i>Agriculture, Forestry, Fishing, Hunting</i>	18	3	11,616,087	1.55	-
<i>Mining, Quarrying, Oil & Gas Extraction</i>	17	3	5,886,752	2.89	-
<i>Wholesale Trade</i>	13	2	19,354,458	0.67	-
<i>Professional, Scientific, Technical Services</i>	12	2	50,611,073	0.24	-
<i>Information</i>	7	1	15,061,623	0.46	-
<i>Educational Services</i>	7	1	55,863,859	0.13	-
<i>Public Administration</i>	7	1	33,959,174	0.21	-
Total	543	100	684,330,526	0.8	--

* For industries with greater than 5 deaths

Note: Totals and rates were generated by the authors with restricted access to CFOI microdata.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2.

Type of Drug Used in Workplace Overdose Fatality: CFOI 2011–2015

Classification*	Total (%)
Illicit drugs	320 (45%)
Opioids-not-including-heroin	159 (22%)
Other	130 (18%)
Multiple Drugs (More than one listed)	54 (8%)
Unknown	47 (7%)
Grand Total	710

* Illicit – Methamphetamine, PCP, Narcotics, Cocaine, Heroin, Bath salts, Cannabinoids, Any “illicit” drug

Opioids – Hydrocodone, Fentanyl, Methadone, Opiate, Morphine, Oxycodone, Oxymorphone, Codeine

Other-Amphetamine, Benzodiazepines, Any prescribed drug

Note: Totals were generated by the authors with restricted access to CFOI microdata.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript