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Fatalities involving substance use among U.S. oil and gas extraction workers identified through an industry specific surveillance system (2014–2019)

Alejandra Ramirez-Cardenas, MPH[1], **Kaitlin C. Wingate, MPH**[1], **Richard Pompei, DO, MPH**[2], **Bradley King, PhD, MPH**[1], **Kenneth Scott, PhD, MPH**[1], **Kyla Hagan-Haynes, MPH**[1], **L. Casey Chosewood, MD, MPH**[3]

[1]Western States Division, National Institute for Occupational Safety and Health

[2]Department of Environmental and Occupational Health, Colorado School of Public Health, University of Colorado, CU Anschutz, Aurora, CO

[3]Office of the Director, National Institute for Occupational Safety and Health

Abstract

Objective: Characteristics of oil and gas extraction (OGE) work, including long hours, shiftwork, fatigue, physically demanding work, and job insecurity are risk factors for substance use among workers. Limited information exists examining worker fatalities involving substance use among OGE workers.

Methods: The National Institute for Occupational Safety and Health's Fatalities in Oil and Gas database was screened for fatalities involving substance use from 2014 through 2019.

Results: Twenty-six worker deaths were identified as involving substance use. Methamphetamine or amphetamine were the most common substances (61.5%) identified. Other contributing factors were lack of seatbelt use (85.7%), working in high temperatures (19.2%), and workers' first day with the company (11.5%).

Conclusions: Employer recommendations to mitigate substance use related risks in OGE workers include training, medical screening, drug testing, and workplace supported recovery programs.

1. Introduction

There were over 106,000 drug overdose deaths in the United States in 2021.[1] The age-adjusted rate of drug overdose deaths has drastically increased recently, with a 14% increase from 28.3 per 100,000 standard population in 2020 to 32.4 in 2021.[1] While synthetic opioids other than methadone (e.g., illicitly-manufactured fentanyl) have been involved in more than half of these overdose deaths, deaths involving psychostimulants (e.g., methamphetamine) and cocaine have also increased in recent years.[2] Workplace overdose deaths have also increased and are likely to be underestimated.[3] Among worker fatalities due to exposure to

harmful substances or environments, the percent change in unintentional overdose deaths at work from nonmedical use of drugs or alcohol was 19.5% from 2020 to 2021.[4] Deaths from excessive alcohol use have been increasing for decades, with growth accelerating during the COVID-19 pandemic during which the number and rate of alcohol deaths increased by 25%.[5] Alcohol and drug use have been associated with increased costs to employers due to lost productivity, absenteeism, high turnover, and increased health care costs.[6,7] However, the association between substance use and work injuries is complex and findings related to substance use and injuries at work are mixed, as most studies have not found an association and positive associations that have been found are small.[8]

The U.S. oil and gas extraction (OGE) industry employed 353,487 workers in 2020.[9] Over half (54%) of these workers were employed by well servicing contractors who perform specialized tasks to service existing wells (coded as 213112 in the North American Industrial Classification System [NAICS]), 36% by operators who lease and manage well sites (NAICS 211), and the remaining 11% by drilling contractors (NAICS 213111) who drill oil and gas wells and perform well control activities.[9,10] The majority (82%) of OGE workers are male and have a mean age of 43 years.[11] Many characteristics of OGE work, including long work hours, shiftwork, fatigue, and high physical demand are also risk factors for substance use.[12–19] The OGE industry is also characterized by job insecurity due to a boom and bust cycle where high energy prices during a boom result in high employment and economic growth, while low energy prices during a bust slow economic growth and employment decreases.[20]

One report of workplace substance use found that from 2008 to 2012, workers in the mining, quarrying, and OGE sector (NAICS 21), the majority of which are OGE workers, had the highest rate of heavy alcohol use (17.5%) of any sector.[21] The rate of past-year substance use disorder among mining workers was 11.8% and past-month illicit drug use was 5.0%.[21] Workplace overdose fatality rates and excess deaths due to drug overdose are also highest among workers in the mining, quarrying, and OGE sector and extraction occupations, respectively.[3,22] One study of New Mexico oil and gas worker fatalities reported that of the identified cases with toxicology results, 18% detected alcohol and 19% were positive for illicit drugs.[23]

Limited information exists to examine substance use among OGE workers. The National Institute for Occupational Safety and Health's (NIOSH) Fatalities in Oil and Gas Extraction (FOG) database was developed to collect detailed information about worker fatalities in the U.S. OGE industry, including details of fatalities involving substances. The FOG database has been used to help identify and better understand various hazards in the industry, guide interventions, and develop recommendations to protect OGE workers.[24] The purpose of this report is to describe several cases of fatalities involving substance use extracted from the FOG database and to provide recommendations to mitigate substance use related risks.

2. Methods

The FOG database consists of investigation files from 2014 to 2019 specific to OGE worker fatalities due to an injury or onset of illness occurring during on-site incidents, work-related

travel or transport, or extended commutes.[24] FOG investigation files are primarily sourced from Occupational Safety and Health Administration (OSHA) case files, which contain toxicology reports, autopsy findings, crash reports, and other relevant source documents. Additional investigation files are compiled using media reports identified through web scraping and crash reports identified through the Texas Department of Transportation Crash Records Information System. FOG was initially screened for all worker deaths from all available years of data (2014 through 2019) that mentioned drugs or alcohol, as described in Figure 1. This involved filtering the database for worker deaths with a FOG event type, defined as how the fatal injury or illness occurred, of "Exposure: alcohol or drug overdose." The database was also filtered for worker deaths involving substance use with drug use or alcohol consumption noted as a human factor. All vehicle related worker deaths in the database were filtered for those that were identified as involving drugs or alcohol. A keyword search was also performed for "alcohol," "amphe," "cannabis," "cocaine," "depres," "drug," "marij," "opioid," "stimul," "substance," "THC," and "tox," in the incident descriptions. All available documents in the investigation file were reviewed to identify the substances involved.

An epidemiological case definition was developed and applied to each worker death identified through the screening process, as outlined in Table 1, to categorize whether a death was caused by substance use, or substance use was a contributing or a suspected contributing factor. For the remainder of this paper, "decedent" will refer to a worker death. In this report, a substance was an illicit drug, alcohol, or medication that when used or overused can cause harm related to physical or cognitive impairment. Nicotine and caffeine are rarely implicated in substance use death, so those substances were not included in this report. Descriptive statistics were used to characterize features of deaths involving substance use and four decedent cases were highlighted to qualitatively examine factors contributing to the fatality. Decedent case summaries used narrative data from the OSHA case files and media reports.

3. Results

Descriptive Statistics

The initial screen of 526 FOG cases from 2014 to 2019 resulted in 39 decedents with potential substance use (Figure 1). These 39 decedents were reviewed using the criteria from Table 1. Thirteen decedents identified in the initial search were excluded because they did not meet the epidemiological case definition. Five of these decedents had positive toxicology results for an individual that was not employed in OGE (i.e., OGE worker killed in a motor vehicle crash where the other motorist had a positive toxicology result as noted in the crash report). Two decedents did not have evidence of a positive toxicology result. One decedent whose death was thought to involve substance use was of a worker who had drug paraphernalia on them at the time of death; however, their toxicology report was negative for any substance use. One decedent with suspected alcohol intoxication resulted in an incomplete blood alcohol analysis due to a contaminated blood specimen. In incidents involving more than one fatally injured worker, four decedents were excluded because only workers meeting the case definition in Table 1 were included as decedents in this analysis.

After exclusion of these thirteen decedents, there were 26 decedents with confirmed substance use (Figure 1). Of the 26 decedents, 7 (26.9%) met the criteria for substance use as the cause of the worker's death, 7 (26.9%) met the criteria for substance use as a contributing factor, and the remaining 12 (46.2%) cases met the criteria for substance use as a suspected contributing factor (Table 2). The individuals were all male, ranging in age from 19 to 53 years of age with a median age of 31.5 years. The majority of the 26 decedents were employed by well servicing contractors (61.5%, n=16). Over half of the decedents were involved in motor vehicle crashes (53.8%, n=14). A variety of substances were identified in the 26 decedents. Central nervous system (CNS) stimulants were the most common category of substances. Methamphetamine or amphetamine, both CNS stimulants, were the most common substances (61.5%, n=16). Other substances also identified included alcohol (23.1%, n=6), cannabis [delta-9 tetrahydrocannabinol (THC)] or its metabolite [delta-9 carboxy THC] (15.4%, n=4), cocaine or its degradation product benzoylecgonine (11.5%, n=3), and opioids (11.5%, n=3).

Polysubstance use was identified in 9 (34.6%) of the decedents (data not shown). In three of the four decedents with positive cannabis toxicology screen, cannabis was identified in conjunction with stimulants. The fourth decedent was involved in a motor vehicle crash and had a toxicology screen with alcohol and delta-9-THC levels at 18 nanograms per milliliter (ng/mL). Of the six decedents with a positive blood alcohol concentration (BAC), one decedent was a worker who disappeared from the worksite and was found the next morning drowned in a shallow body of water. The toxicology results for this worker identified stimulants, cannabis, and a BAC of 0.017. Because this worker was not found until the following day, it is believed that the BAC is a result of decomposition and not of alcohol use. The other five decedents were involved in motor vehicle crashes. In one crash the worker had a BAC of 0.268 and in two other crashes both workers had a BAC of 0.24. In the fourth motor vehicle crash, the worker had a BAC of 0.012. There was one crash where the worker was determined to have been driving under the influence of alcohol due to the reported BAC, however the BAC was not included in the crash report and therefore unknown.

In addition to substance use, several notable contributing factors were identified across the decedents including lack of seatbelt use (85.7% of motor vehicle crashes, n=12), working in high temperatures (19.2%, n=5), and the fatal event occurring on the worker's first day with the company (11.5%, n=3).

Decedent case summaries

The following decedents were chosen to illustrate the diverse circumstances of the role of substance use in the OGE worker population and how substance use can present on-the-job. The case summaries also provide examples of polysubstance use and the contributing factors previously mentioned.

Case Example #1: Cause of death

Substances identified: Heroin, methamphetamine, and buprenorphine

Summary: A worker walked behind an oil rig while on the job and stumbled back to the front. The worker then collapsed and was unresponsive. Drug paraphernalia was found near his body. The death was ruled an accidental overdose by the county coroner.

Case Example #2: Cause of death

Substances identified: Cocaine, methamphetamine

Summary: A worker on the first day on the job was operating a power washer to clean threads on pipe on a 98°F summer day. Near the end of the day, the worker stumbled while walking on boards on top of the pipes. He stated that he felt hot, so his two colleagues who were also on their first day took him to the cooling trailer, where he was provided with fluids. He then went into the company truck and turned on the air conditioner. His colleagues continued to finish the tasks for the day and would periodically check on him in the truck where they found him asleep and snoring. On their last check up, however, they found that the worker had died. The crew supervisor briefed the new workers on heat stress prior to starting work, however according to the OSHA investigation they had not been adequately trained. Based on the toxicology report, the cause of death was ruled acute cocaine and methamphetamine intoxication by the forensic pathologist. This case was initially deemed by OSHA to be a result of heat exhaustion because cocaine and methamphetamine intoxication symptoms can mimic heat stress related illness.

Case Example #3: Contributing factor

Substances identified: Methamphetamine and alcohol

Summary: Two workers in a pickup truck were hauling a trailer for a well servicing company. While on a rural two-lane highway the vehicle veered off the edge of the pavement causing the vehicle to jerk. The driver over-corrected to the left causing the vehicle and trailer to skid into the oncoming lane and off the side of the road where the vehicle struck a vent pipe and utility pole. The vehicle and trailer then separated. Both the driver and passenger were not wearing seatbelts and were ejected while the pickup truck was rolling. The driver died on-scene and the passenger was hospitalized. Based on findings from the post-incident toxicology report, the crash investigator’s opinion was that intoxication due to drugs and alcohol was the main causative factor in this crash.

Case Example #4: Suspected contributing factor

Substances identified: Methamphetamine and amphetamine

Summary: Two workers were attempting to dislodge the locking latch pin of a tractor trailer. Due to a miscommunication between the two workers, one of the workers moved the trailer without knowing that the other worker was underneath and ran over the worker. Methamphetamine and amphetamine were noted in the deceased worker’s toxicology report.

4. Discussion

The authors used an industry-specific surveillance system to identify and describe deaths involving substance use in the OGE industry. This analysis identified noteworthy findings regarding the type of substances being used and potential contributing factors. CNS stimulants were the most common substance class identified among the 26 decedents. This aligns with recent findings from an analysis of fatally injured U.S. workers from 2011 to 2020 that identified stimulants as the most prevalent class of substances involved in overdoses based on toxicology results.[25] Signs and symptoms of stimulant toxicity can include hyperthermia, hyperactivity, chest pain, or palpitations, resulting in hypertensive emergencies or strokes.[26] In five of the decedents with positive toxicology screens for stimulants, the workers were involved in strenuous outdoor work during high temperatures. Stimulants are known to alter thermoregulation resulting in hyperthermia and may predispose a user to heatstroke.[27] More specifically, cocaine and amphetamines can cause hyperthermia due to an increase in internal heat production.[28] For three of these five decedents, it was the worker's first day on the job. Lack of training and acclimatization was noted as an additional contributing factor for these decedents. Decedent case example #2 illustrates these two points by outlining a case where a worker died of stimulant intoxication on the first day on the job and whose symptoms were mistaken for those of heat stress related illness. The nature and organization of work in the OGE industry predisposes workers to an increased state of fatigue.[15,29] Stimulants are known to be commonly used in an effort to extend wakefulness, increase alertness, and counter fatigue.[26,30,31]

Cannabis was identified in the positive toxicology screen of four of the decedents. Cannabis, or its active ingredient delta-9-THC, is known to have negative effects on cognition, memory, perception of time, judgement, and coordination.[32] At the time of use, delta-9-THC levels can peak between 100–400 ng/mL and typically drop below 10 ng/mL within a few hours of use.[33] Given the lipid soluble nature of delta-9-THC and excretion into the bloodstream, time or amount of use cannot be reliably assessed during a postmortem toxicology screen.[34,35] There is also a poor correlation between serum delta-9-THC concentrations and impairment; however, the American College of Occupational and Environmental Medicine has proposed a delta-9-THC serum level of 5 ng/mL to determine impairment.[35,36] While cannabis remains a prohibited substance under federal law, it has been legalized for medical and nonmedical adult use in many states. Cannabis is the most frequently used federally illicit drug in the United States and a 2017 report found it to be the most frequently used drug among Canadian oil and gas workers.[32,37] As more states legalize cannabis use, employers are finding challenges in detecting impairment associated with cannabis use. More research is needed to understand the occupational risk of cannabis use.[38,39]

Alcohol was present in six of the 26 decedents. For the decedent whose body was found the next morning, toxicology testing was not performed until that point in time. The worker's BAC results are believed to be due to changes after death, illustrating one of the challenges with post-mortem BAC determination. Environmental factors that may have resulted in the post-mortem BAC increases such as water temperature, trauma to the body, and degree of putrefaction need to be considered.[40] Additional factors that affect post-mortem BAC

measurements are alcohol metabolism phase, presence of preservative in the collected blood sample, sample storage condition, variation in sample media, putrefaction, and post-mortem alcohol formation.[41] In the other five decedents with a direct post-mortem BAC measurement, blood was drawn at the time of the crash and therefore the BAC elevations are not likely due to changes after death.

BAC levels in the cases identified through FOG of 0.012 to 0.268 would result in psychomotor impairments ranging from slightly impaired judgement, mild euphoria, and decreased inhibition to severe motor impairment, lethargy, mental confusion, and severe sensory impairment, respectively.[41] According to the U.S. federal standard 32 CFR § 634.34, a person with a BAC of 0.08 is considered to be driving while intoxicated; however, legal limits can vary based on several factors such as state, age, and whether a commercial vehicle was being driven.[42,43] It should be noted that direct post-mortem BAC measurement may not accurately characterize a driver's impairment level at time of death. While alcohol exhibits a dose dependent effect on psychomotor and cognitive impairment, levels alone do not define impairment and cannot be effectively used to describe toxicant effects in individuals with alcohol use disorder. In individuals who have developed alcohol tolerance, alcohol levels provide minimal information in isolation to define clinical impairment or intoxication.[44] Seatbelt non-use was identified as an important contributing factor in this analysis, as it was found in 12 out of the 14 motor vehicle crashes. Previous research found motor vehicle crashes to be the leading cause of fatalities among OGE workers and noted lack of seatbelt use as a contributing factor.[45] Lower rates of seatbelt use and other risky driving behaviors have also been associated with drug and alcohol use among drivers.[46]

Opioids were present in three of the decedents. Drug overdose involving illicit opioids while on the worksite was the cause of death for two of the decedents. The third decedent was a water hauler involved in a motor vehicle crash who tested positive for unspecified opioids. All cases with available toxicology reports showed that testing was performed to check for the presence of opioids; however, standard toxicology screens might not detect synthetic opioids like fentanyl.[47] A recent study analyzing post-mortem toxicology results of 73 New Mexico oil and gas workers did not identify any workers with opioids in their system at the time of death.[23] The FOG database does not have enough information to draw conclusions on opioid use in the OGE worker population.

Polysubstance use was identified in nine of the 26 decedents. Mixing stimulants, depressants, or alcohol can lead to synergistic, unpredictable effects.[48] Notably, decedent case example #1 illustrates polysubstance use where a stimulant, opioid, and buprenorphine (which is often used to treat opioid use disorder) were present. Combining buprenorphine with stimulants may counteract the effects of buprenorphine, while combining buprenorphine with opioids can lead to respiratory depression resulting in death.[49] One decedent in this report combined gabapentin (a drug used to treat neuropathic pain) with a CNS stimulant. While a recent report found that less than 10% of drug overdose deaths detected gabapentin in combination with stimulants, gabapentin's involvement in fatal opioid overdoses in increasing.[50]

The detection of buprenorphine in decedent case example #1 also raises an important and unstudied issue among OGE workers: access to and ongoing engagement in treatment for substance use disorders. Numerous evidence-based interventions exist at the population and individual levels to prevent alcohol-related harms.[51] Medications for opioid use disorder (MOUD) including buprenorphine, methadone, or naltrexone remain the only evidence-based intervention to prevent overdose deaths.[52,53] However, in 2019, approximately 1 in 4 people needing treatment for opioid use disorder actually received MOUD, and there were significant gaps in access to MOUD among several sociodemographic characteristics, such as urbanicity.[54] OGE workers often live and work in rural areas where access to opioid use disorder treatment providers is less robust than in urban areas.[55] The working conditions in OGE (e.g., remote locations far from treatment) may make adherence to treatment difficult, though telehealth may help in some situations.[56] Finally, while there are some promising strategies to treat stimulant use disorder, there are no treatments approved by the U.S. Food and Drug Administration, and no evidence-based interventions at the population level.[57] Additional research identifying how to prevent substance use disorders and their health effects among OGE workers is needed.

Considerations for prevention

The findings from this report underscore the importance that employers provide adequate training, medical screening, drug testing, access to treatment, and workplace supported recovery (WSR) programs to mitigate the risks related to substance use among OGE workers.

Comprehensive health and safety training relevant to substance use should be considered for the OGE workforce and can include: impairment risk and recognition (especially for new workers), basic first aid overdose response, and heat stress (prior to their first day on-location). First aid training in response to substance use incidents should include recognizing and responding to signs and symptoms of an overdose. Despite identifying few deaths involving opioids, it is recommended that all worksites are equipped with naloxone, a safe and effective medication designed to reverse opioid overdose, and implement a workplace naloxone use program to ensure that all workers on site receive training on ways to administer naloxone and recognize when additional doses are needed.[58] If signs or symptoms of an overdose are suspected, it is recommended to always administer naloxone, even if it is unknown if it is an overdose involving opioids, and call emergency services immediately.[59] Additionally, as part of basic first aid training, workers should be taught to recognize and respond to signs and symptoms of heat stress as outlined in Lin et al. 2023,[60] how to perform cardiopulmonary resuscitation (CPR), and how to use an automated external defibrillator (AED) if available onsite. This is especially important for OGE workers who oftentimes work in remote locations where emergency services may not be readily available.[61]

It is recommended that all workers receive a health screen prior to working in the OGE industry. Health screens should follow 29 C.F.R. § 1630.14 and be treated as confidential medical records.[62] The screens should include a review of medications the worker is taking that may affect their ability to perform essential functions, to ensure that the worker

can perform their job safely and provide a reasonable accommodation, if necessary. For example, workers who are taking amphetamines are at higher risk of heat stress associated injuries and will need extra precautions when working in hot environments, such as specialized acclimatization regimens. Other medications may cause drowsiness, so workers on these types of medications may be assigned tasks that are not safety critical. Additionally, if a worker is on a pain management plan with opioids, the health screen should include an assessment to ensure fitness for duty.

The International Association of Oil and Gas Producers (IOGP) and International Petroleum Industry Environmental Conservation Association (IPIECA) developed drug and alcohol testing guidance specific to the OGE industry in accordance with 29 C.F.R. §1904.35(b)(1)(iv).[63,64] The guidance states that those in safety-sensitive positions may be tested at various intervals such as at pre-employment, random group or individual testing, post-incident as part of the root cause investigation, and when question arises due to reasonable suspicion. Drug testing should only be used to promote workplace safety and health and is not to be used by an employer to penalize a worker for reporting a workplace related injury.[64] It is recommended that OGE employers provide workers with positive drug test results with access to evidence-based treatment and take a *Total Worker Health*® (TWH) approach by providing a recovery supportive workplace.[65]

The TWH approach promotes the use of WSR programs to decrease the risk for substance use and its progression to a substance use disorder. WSR programs also help workers with existing substance use disorders by lowering barriers to seeking care, receiving care, and maintaining recovery without the penalty of losing their employment.[65] Employers with WSR programs focus on preventing exposure to workplace factors such as injuries, illnesses, or work demands that could cause initial substance use. WSR programs may benefit an employer by improving workplace safety, reducing workers compensation costs, and increasing job stability and productivity. These programs provide a holistic approach to workplace safety and health, attending to issues workers face both on and off the job.

Limitations

There are several limitations of the FOG database when examining fatalities involving substance use. Not all decedents identified through the FOG database underwent autopsy or relevant toxicology testing, resulting in missing data, so it is likely that the findings in this report are underreporting the true extent of fatalities involving substance use in the OGE industry. Additionally, while OSHA does not prohibit post-incident drug testing, its guidance states that employers should not administer blanket post-incident drug tests in situations when drug use likely did not cause an injury.[64] Toxicology testing in itself has several inherent limitations, for example methamphetamine and amphetamines are reported together in this report due to the difficulty in identifying whether the drug or metabolite were identified. A small portion of methamphetamine is metabolized to amphetamine and some studies suggest that amphetamine may be able to be metabolized to methamphetamine.[66] The toxicology tests in the investigation files are not designed to identify the specific type or the concentration of methamphetamine or amphetamine present and are not a reliable method to determine the source of the substance; therefore it is unknown if the cases of

amphetamine identified in this analysis were due to drugs prescribed to the worker by a medical professional or taken illicitly.[67] Another limitation of toxicology testing involves the detection of synthetic cannabinoids which require specialized toxicology methods.[68] It is possible that workers using these substances were not captured in this analysis. Additionally, postmortem toxicology testing requirements and practices vary by state, county, and individual medical examiner or coroner. Fatalities involving substance use in OGE and throughout the U.S. in all industries may be underreported due to non-standardized toxicology testing procedures, disparities in death investigations resources, and less frequent toxicology testing among coroners compared to medical examiners.[69,70] Pharmacokinetics, the movement of the substances in the body, was not investigated due to the lack of temporal information. Additionally, since the FOG database only collects data on fatalities, we are unable to study substance use behaviors or related non-fatal outcomes in the OGE industry. Another limitation is that bias could have been introduced by the overrepresentation of fatal motor vehicle crashes occurring in Texas in the FOG database. NIOSH researchers have access to Texas's centralized crash record information system, so the FOG database identified a greater number of Texas crashes involving an OGE worker.

Conclusion

This report summarizes fatalities involving substance use among U.S. OGE workers and calls attention to the growing issue of substance use among OGE workers. Although the opioid overdose epidemic is at the forefront of media reports and substance use research, over half of the cases discussed in this report involved methamphetamine or amphetamine use, indicating the need for additional research examining workplace overdose deaths, access to substance use disorder treatment, as well as the risks of both legal and illicit substance use among OGE workers. OGE workers face several risk factors for workplace substance use including insecure employment, long work hours, fatigue, and physically demanding working conditions and environments. This report also identified lack of seatbelt use, high temperatures, and job inexperience as contributing factors to fatalities involving substance use. Considerations for the OGE industry include preventing work conditions that might predispose workers to substance use, providing adequate training, conducting health screening prior to working in the industry, performing drug testing when appropriate, promoting access to treatment for workers with substance use disorders, and implementing WSR programs.

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Clinical significance statement

describing the significance to clinical practice of the information being presented.

Mitigating substance use related risks is imperative in preventing worker morbidity and mortality. This is especially important in workers in safety sensitive positions, such as those in the oil and gas industry, where impairment not only compromises their safety but the safety of those around them.

Learning objectives:

- After participating in this activity, the learner will be able to:
- Identify the most common type of substances used among fatally injured workers in the Fatalities in Oil and Gas Database.
- Summarize common factors contributing to deaths involving substance use in OGE workers.
- Discuss considerations for preventing substance use related risks in OGE workers.

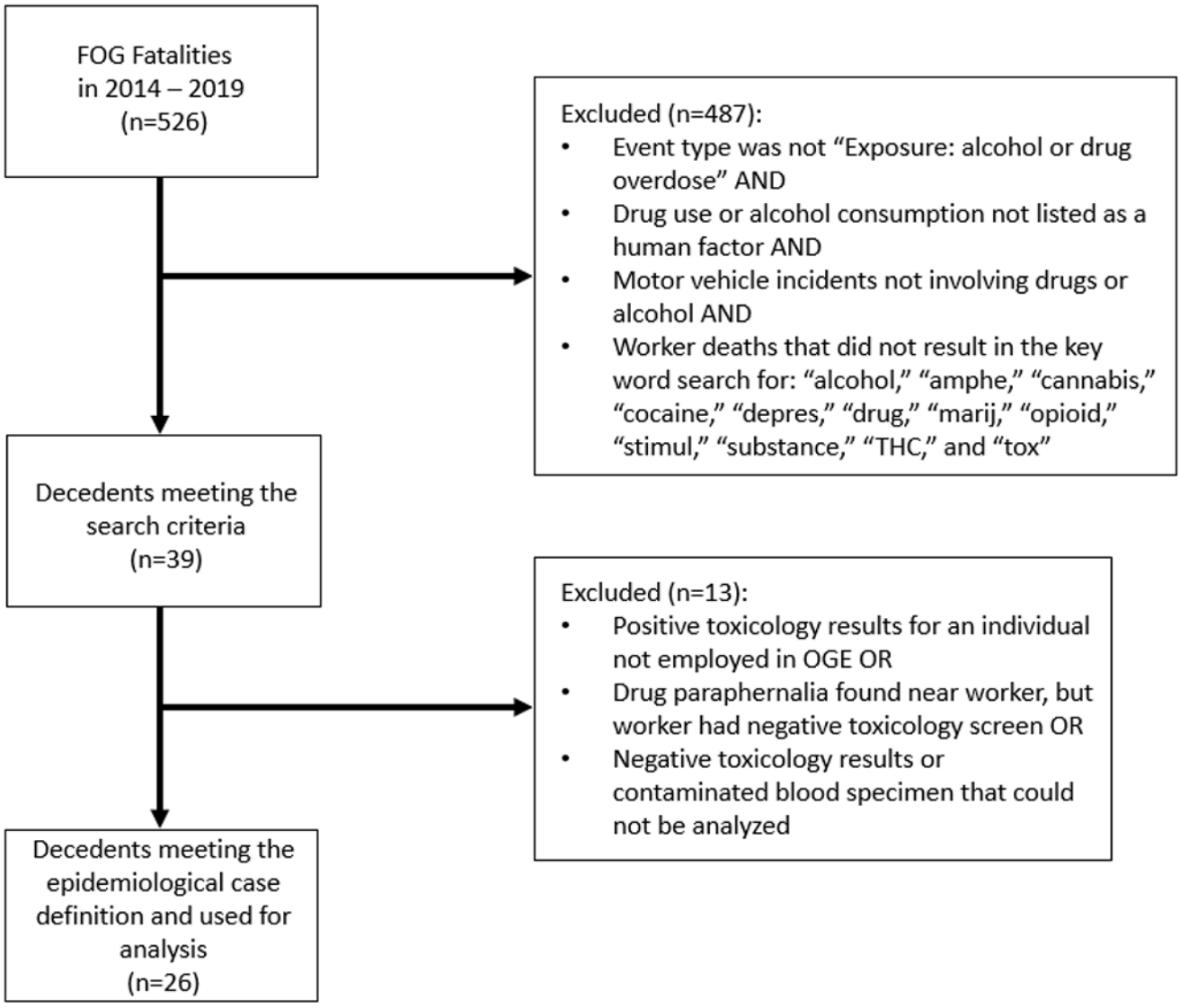

Figure 1:
Screening process to select decedents whose death involved substance use from the Fatalities in Oil and Gas (FOG) database

Table 1:

Role of substance* use in worker's death

Cause of death	Cause of death determined by the death investigator (i.e., medical examiner, coroner, or forensic pathologist) to be: • Overdose • Acute drug toxicity • Acute alcohol toxicity
Contributing factor	Substance use noted as a contributing factor based on positive toxicology findings in one of the following locations: • Death investigation file: Identified by the death investigator as causing impairment leading to the fatal injury • OSHA case file: Identified as a contributing factor in the OSHA investigation medical review • Crash report
Suspected contributing factor	Substance use identified through: • Positive toxicology at time of death • Potential contributing factor listed in the crash report

* A substance is an illicit drug, alcohol, or medication that when used or overused can cause physical or cognitive impairment.

Table 2.

Characteristics of deaths involving substance use among OGE workers, Fatalities in Oil and Gas (FOG) database, 2014–2019 (n=26)

	Count	% of Total
Role of substance use in worker's death		
Cause of death	7	26.9
Contributing factor	7	26.9
Suspected contributing factor	12	46.2
Age (years)		
Median (range)	31.5(19–53)	
Sex		
Male	26	100
NAICS		
213111 – Drilling Operations	5	19.2
213112 – Well Servicing	16	61.5
Other	2	7.7
Unknown	3	11.5
Event type		
Exposure		
Alcohol or drug overdose	6	23.1
Environmental	4	15.4
Vehicle incident	14	53.8
Other	2	7.7
Substance [A]		
Central Nervous System stimulants		
Methamphetamine or amphetamine	16	61.5
Cocaine[B]	3	11.5
Unspecified	1	3.8
Alcohol	6	23.1
Cannabis[C]	4	15.4
Opioids	3	11.5
Other	4	15.4
Contributing factors		
Seatbelt non-use	12	85.7[D]
High temperatures	5	19.2
New worker	3	11.5

[A] Polysubstance use was identified in 9 (34.6%) of the decedents.

[B] Includes cocaine or its degradation product benzoylecgonine

[C] Includes Delta-9 tetrahydrocannabinol (THC) or its metabolite Delta-9 carboxy THC

[D] Percent based on denominator of 14 motor vehicle crashes