



## OPIOIDS AS EVIDENCE; COURTROOM BEST PRACTICES

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Ombudsman to the State Crime Laboratory

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Each document is linked via hyperlink when available. Much of this was designed for online consumption and is not suited for printing out and reading. The scientific article not available online is included in your materials as well as some other selected items.

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- <https://www.cdc.gov/drugoverdose/pdf/aha-patient-opioid-factsheet-a.pdf>
- <https://harmreduction.org/blog/fentanyl-exposure/>
- Michael J. Lynch, Joe Suyama & Francis Guyette (2018) Scene Safety and Force Protection in the Era of Ultra-Potent Opioids, Prehospital Emergency Care, 22:2, 157-162, DOI: 10.1080/10903127.2017.1367446

## **SELECTED MATERIALS**

**§ 114-62. North Carolina State Crime Laboratory Ombudsman.**

The position of ombudsman is created in the North Carolina State Crime Laboratory within the North Carolina Department of Justice. The primary purpose of this position shall be to work with defense counsel, prosecutorial agencies, criminal justice system stakeholders, law enforcement officials, and the general public to ensure all processes, procedures, practices, and protocols at the State Crime Laboratory are consistent with State and federal law, best forensic law practices, and in the best interests of justice in this State. The ombudsman shall mediate complaints brought to the attention of the ombudsman between the Crime Laboratory and defense counsel, prosecutorial agencies, law enforcement agencies, and the general public. The ombudsman shall ensure all criminal justice stakeholders and the general public are aware of the availability, responsibilities, and role of the ombudsman and shall regularly attend meetings of the Conferences of the District Attorneys, District and Superior Court Judges, Public Defenders, the Advocates for Justice, and Bar Criminal Law Sections. The ombudsman shall make recommendations on a regular basis to the Director of the State Crime Laboratory and the Attorney General of North Carolina as to policies, procedures, practices, and training of employees needed at the Laboratory to ensure compliance with State and federal law, best forensic law practices, and to resolve any meritorious systemic complaints received by the ombudsman. (2011-19, s. 6(a); 2013-360, s. 17.6(d), (n).)

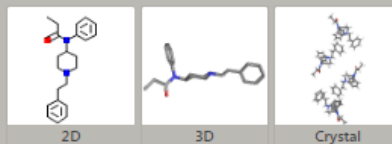
# OVERPOWERING NC'S OPIOID EPIDEMIC



Misuse. Addiction. Double the overdoses in the past ten years alone. Opioids—including prescription pain medication, heroin, and fentanyl—are devastating lives in North Carolina. It's time for all of us to take the first step in solving the problem, because together, we are more powerful than opioids—and together, we can take back our communities.

PubChem CID: 3345

Structure:



[Find Similar Structures](#)

Chemical Safety:



Acute Toxic Irritant Health Hazard

[Laboratory Chemical Safety Summary \(LCSS\) Datasheet](#)

Molecular Formula:  $C_{22}H_{28}N_2O$

Chemical Names:

fentanyl  
Fentanil  
Phentanyl  
Fentora  
Duragesic

[More...](#)

Molecular Weight: 336.479 g/mol

Dates:

Modify: 2019-06-08 Create: 2005-03-25

A potent narcotic analgesic, abuse of which leads to habituation or addiction. It is primarily a mu-opioid agonist. Fentanyl is also used as an adjunct to general anesthetics, and as an anesthetic for induction and maintenance. (From Martindale, The Extra Pharmacopoeia, 30th ed, p1078)

[from MeSH](#)

Fentanyl is an Opioid Agonist. The mechanism of action of fentanyl is as a Full Opioid Agonist.

[from FDA Pharm Classes](#)

Fentanyl is a synthetic, lipophilic [phenylpiperidine](#) opioid agonist with analgesic and anesthetic properties. Fentanyl selectively binds to the mu-receptor in the central nervous system (CNS) thereby mimicking the effects of endogenous opiates. Stimulation of the mu-subtype opioid receptor stimulates the exchange of [GTP](#) for GDP on the G-protein complex and subsequently inhibits [adenylate](#) cyclase. This results in a decrease in intracellular [cAMP](#) and leads to a reduction in the release of neurotransmitters such as [substance P](#), [GABA](#), [dopamine](#), [acetylcholine](#) and [noradrenaline](#). The analgesic effect of fentanyl is likely due to its metabolite [morphine](#), which induces opening of G-protein-coupled inwardly rectifying [potassium](#) (GIRK) channels and blocks the opening of N-type voltage-gated [calcium](#) channels, thereby resulting in hyperpolarization and reduced neuronal excitability.

OP-ED CONTRIBUTORS

# Opioid Hysteria Comes to Massachusetts Courts

By Jeremy Samuel Faust and Edward W. Boyer

Jan. 23, 2018

This month, Massachusetts became the first state to ban fentanyl and carfentanil from being brought into courthouses as exhibits, out of concern that these substances are simply too dangerous to be in public places. The policy is based in part on the idea that even minuscule amounts of skin exposure to these drugs can be life-threatening. This is patently false — and we fear that it will worsen what is already a public health crisis.

This false belief about the danger of these drugs seems to stem from several unsubstantiated — though widely disseminated — media reports over the past year. In one such story, a drug patrolman became ill after brushing some powder off his uniform that he picked up while searching a suspect's car. First reported by local news in Ohio, the story was picked up by “CBS This Morning,” The Washington Post and CNN, to name a few. In another case, also in Ohio, three nurses went from cleaning a patient's room to waking up in hospital beds of their own. After local media reported it, and The Associated Press and US News & World Report took it national. In both cases, the victims were given naloxone, the highly effective opioid reversal agent, and ultimately recovered.

But the damage was done. Both stories are examples of the post hoc ergo propter hoc fallacy: Just because somebody received naloxone and later recovered is not by itself proof that the medication had any more effect than that other tried-and-true antidote for what are likely to have been severe panic attacks: time. Indeed, given the tall-tales circulating in the press and in law enforcement circles about the supposed hazard of passive fentanyl exposure, one can hardly blame them for panicking.

This paranoia is reflected in the new Massachusetts courtroom policy, which bolsters the delusion that opioids can kill via unintended casual contact. As emergency physicians, we are concerned not just about this massive public misperception but also about its consequences to public health if emergency medical workers or other care providers are scared out of performing their normal lifesaving duties.

Stolbach says it's "extremely unlikely" that somebody could overdose just from touching fentanyl — or similar drugs like carfentanil — with bare hands. "These drugs, they're just simply not absorbed fast enough or well enough through skin," he said.

The misconception, Stolbach explained, likely comes from the fact that fentanyl is commonly administered as a legitimate pain medication through patches that are applied to the skin. But the patches are "a totally different situation to powdered, loose fentanyl," he said, noting that it took years of research for pharmaceutical companies to make the patch work.

"If it was so well-absorbed through skin, people wouldn't inject it," Stolbach said of illicit fentanyl powder. "They'd rub it into their skin. If it was so well absorbed, you'd see lots of reports of dealers dropping dead [from touching it]. We're just not observing that."

"If it was so well-absorbed through skin, people wouldn't inject it."

So what really happened to Green?

Faust declined to speculate, though he acknowledged it's plausible that the officer got fentanyl on his fingers into his nose, eyes, or mouth, which could have conceivably caused an overdose. But he also noted that's not what Green says happened.

"The facts we've been told do not explain that," Faust said. "It has to be some other thing we don't know about, that we haven't been told, that may not even be known by people who were there. We don't have an explanation."

For his part, Green remains adamant that he OD'd solely from getting powder on his fingers. He told local broadcaster WKBN that Faust "has no clue what happened," and said he experienced "aches and pains" and "the total loss of control of my body."

"My head felt like it was in a vice for two weeks," Green said. "I would be standing here talking to you like this and I would become very dizzy and disoriented to where I'd have



We've been here before, and with similar destructive effect. In 1987, four years after it was determined that H.I.V. could be spread only through sexual or blood-to-blood exposure, there were still doctors and dentists who refused to see H.I.V./AIDS patients out of lingering and irrational fears about its contagion. Even among those unlucky few who experienced needlestick injuries when treating H.I.V.-positive patients, fewer than 1 out of 300 contracted the virus (the number is even lower now).

Unlike in epidemics of the past, we have a commanding medical understanding of the nature of today's culprit. In contrast to tuberculosis, cancer and AIDS — in which, as Susan Sontag described in "Illness as Metaphor" (1978) and "AIDS and Its Metaphors" (1989), the medical mystery of these entities contributed to public fears about contracting them — there should be no need to demythologize the opioid epidemic since we created these powerful synthetic opioids ourselves. And yet, paradoxically, the opioid crisis has perhaps unveiled a diametrical societal inclination: to actively mythologize a well-understood entity, metamorphosing it into a frightful and enigmatic one, bestowing contagion where none exists.

Fentanyl and carfentanil are synthetic opioids. They are many times stronger than morphine and have a well-established safety record in medical and veterinary use. When abused they can kill. These substances are dangerous in high quantities when injected or ingested by mouth or vigorous sniffing. But clinical toxicity (let alone a little high) from fleetingly touching even the purest powder forms of these compounds is simply impossible. After all, as our colleague Andrew Stolbach of the Johns Hopkins University School of Medicine has noted, if users could get their fix by touching fentanyl, they wouldn't bother injecting it.

While bogeymanism may effectively serve to discourage some people from abusing these substances in the first place, it would be horrible if it were to dissuade emergency medical workers, medical professionals and civilians from performing noble and lifesaving acts, such as delivering lifesaving doses of naloxone. The tragedy is that it's already occurring. In some parts of the country, emergency medical workers aren't being permitted to carry naloxone. Recent fentanyl overdose scenes have crossed an invisible line into absurdity, in some instances resembling chemical war zones, Hazmat suits and all, where gloves and maybe a mouth cover would have sufficed. Policies like the one enacted by courthouses here will only reinforce what appears to be an inclination by at least some local authorities toward alarmist pageantry.

There are some encouraging signs that reason may yet prevail. Last summer, the two top expert bodies in the nation — the American College of Medical Toxicology and the American Academy of Clinical Toxicology — published a position statement debunking the tales that were reported in the press, noting in particular that none of the reported cases have appeared to resemble the constellation of symptoms we see and treat daily in cases of known opioid overdose. We are also heartened to see that local expert groups and even the White House have weighed in on the side of science in attempts to reassure emergency medical workers that they may continue to provide safe and desperately needed care.

But such rational approaches will be undermined if we do not stand against an unfounded hysteria about synthetic opioids that behave within the predictable confines of their chemical nature. When used properly, fentanyl and carfentanil are therapeutic. When they are used improperly, they can ruin lives and kill. And when touched by human hands in powder or liquid form, nothing happens.

If law enforcement, medical professionals and the public begin to harbor irrational beliefs about these drugs countless more of our fellow citizens who need emergency medical attention will die unnecessarily. A little powder on our hands is nothing compared with a whole lot of blood.

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## **ACMT and AACT Position Statement: Preventing Occupational Fentanyl and Fentanyl Analog Exposure to Emergency Responders**

The position of the American College of Medical Toxicology (ACMT) and American Academy of Clinical Toxicology (AACT), is as follows:

Fentanyl and its analogs are potent opioid receptor agonists, but the risk of clinically significant exposure to emergency responders is extremely low. To date, we have not seen reports of emergency responders developing signs or symptoms consistent with opioid toxicity from incidental contact with opioids. Incidental dermal absorption is unlikely to cause opioid toxicity. For routine handling of drug, nitrile gloves provide sufficient dermal protection. In exceptional circumstances where there are drug particles or droplets suspended in the air, an N95 respirator provides sufficient protection. Workers who may encounter fentanyl or fentanyl analogs should be trained to recognize the signs and symptoms of opioid intoxication, have naloxone readily available, and be trained to administer naloxone and provide active medical assistance. In the unlikely event of poisoning, naloxone should be administered to those with objective signs of hypoventilation or a depressed level of consciousness, and not for vague concerns such as dizziness or anxiety. In the absence of prolonged hypoxia, no persistent effects are expected following fentanyl or fentanyl analog exposures. Those with small subclinical exposures and those who awaken normally following naloxone administration will not experience long-term effects. While individual practitioners may differ, these are the positions of American College of Medical Toxicology and American Academy of Clinical Toxicology at the time written, after a review of the issue and scientific literature.

### **Background**

Fentanyl and fentanyl analogs are potent opioid receptor agonists. Fentanyl and its analogs are increasingly implicated in overdose and death in North America among illicit opioid users. The reported mortality from synthetic opioids rose 72.2% (to 9,850) from 2014 to 2015 [1]. Due to limitations in identifying analogs, this figure likely underrepresents death from these drugs. Fentanyl analogs are distributed in North America both as substituted/adulterated powdered heroin and pressed into counterfeit tablet forms of opioids and other medications [2-4]. Authorities in the United States have reported seizures of a variety of these products including fentanyl, fentanyl precursors (e.g., N-phenyl-1-(2-phenylethyl) piperidin-4-amine), and different fentanyl analogs such as acetylfentanyl, butyrylfentanyl, and furanylfentanyl [4]. Other analogs, such as alfentanil, remifentanil, and sufentanil, are used in clinical practice.

Fentanyl is 50-100 times more potent than morphine at the mu-opioid receptor [5-8]. Carfentanil, an opioid developed for veterinary use, is 10,000 times more potent than morphine in animals, although it produces less apnea when dosed therapeutically [6, 9]. Despite its improved therapeutic index compared to morphine, very small errors in carfentanil dosing not unexpected with illicitly distributed drugs will result in lethal doses. There are limited pharmacological data on other analogs found in the illicit drug supply.

To date, there has been limited guidance for emergency responders. In June 2016, DEA published a warning to law enforcement on the dangers of fentanyl cautioning against field testing suspected fentanyl and recommending the use of gloves and a mask when such testing is conducted [10].

The US National Institute for Occupational Safety and Health (NIOSH, Centers for Disease Control) published a bulletin addressing potential danger to law enforcement, public health workers, and first responders who may be exposed to fentanyl or its analogs [11]. Citing an absence of empirical evidence, the NIOSH bulletin recommended use of a P100-rated respirator, nitrile gloves, and eye protection. For personnel performing tasks that may aerosolize fentanyl, the NIOSH bulletin recommended dermal protection such as coveralls or protective sleeves.

Given the prevalence of synthetic opioids, law enforcement and emergency medical services (EMS) agencies have become increasingly concerned about potential exposures while responding to medical calls, crime scenes, or during drug raids [10, 12, 13]. Reports of emergency responders developing symptoms after contact with these substances have described nonspecific findings such as “dizziness” or “feeling like body shutting down”, “dying” without objective signs of opioid toxicity such as respiratory depression [10]. Law enforcement and EMS must balance safety with mobility and efficiency when entering and securing potential scenes where drugs are used, distributed, or produced. We aim to address the risks of occupational exposures to ultra-potent opioids and the role of various types of personal protective equipment to reduce those risks.

## **Methodology**

Our initial recommendations are based on the opinion and clinical experience of a task force of our members. In addition, the authors performed a literature search and drafted this position statement. This document was reviewed and approved by the ACMT Position Statement and Guidelines Committee, was sent to the ACMT Board of Directors, and then sent to the entire College membership for review. After revision by the task force, final approval was made by the ACMT Board of Directors and AACT Board of Trustees.

## **Inhalation Exposure Risk for Fentanyl and Fentanyl Analogs**

Inhalation is an exposure route of concern if drug particles are suspended in the air. Fentanyl has potentially high bioavailability (12-100%) by inhalation [14, 15]. It is highly suspected that a weaponized aerosolized containing carfentanil and remifentanil were used to subdue hostage-takers of a Moscow theater in 2002. One hundred and twenty-five died as a result of this weaponized aerosolized exposure [16]. Although an optimized airborne dispersal device is unlikely to be encountered in a local event, we considered such a scenario for respiratory protection.

Industrial producers of fentanyl use time-weighted average occupational exposure limits (OEL-TWA) for alfentanil (1 mcg/m<sup>3</sup>), fentanyl (0.1 mcg/m<sup>3</sup>), and sufentanil (0.032 mcg/m<sup>3</sup>) to limit exposure [17]. At the highest airborne concentration encountered by workers, an unprotected individual would require nearly 200 minutes of exposure to reach a dose of 100 mcg of fentanyl.

The vapor pressure of fentanyl is very low ( $4.6 \times 10^{-6}$  Pa) suggesting that evaporation of standing product into a gaseous phase is not a practical concern [18].

## **Dermal Exposure Risk for Fentanyl and Fentanyl Analogs**

Fentanyl is amenable to transdermal absorption because of its low molecular weight and lipophilicity [19, 20]. Depending on the specific product, transdermal delivery systems (“patches”) take 3-13 hours to produce a therapeutic serum fentanyl concentration and 35 hours to reach peak concentration [21-24]. Absorption of liquid or aqueous fentanyl increases with larger surface area of application, duration of application, broken skin, and heat. The physical properties of fentanyl analogs are similar to fentanyl, suggesting potential for dermal absorption. In a small volunteer study, sufentanil citrate applied to the forearm and covered in an occlusive dressing was absorbed comparably to fentanyl, although exact bioavailability was not determined [25].

However, incidental dermal absorption is unlikely to cause opioid toxicity. If bilateral palmar surfaces were covered with fentanyl patches, it would take approximately 14 minutes to receive 100 mcg of fentanyl [using a body surface area of 17,000 cm<sup>2</sup>, palm surface area of 0.5% [26], and fentanyl absorption of 2.5 mcg/cm<sup>2</sup>/h [24]. This extreme example illustrates that even a high dose of fentanyl prepared for transdermal administration cannot rapidly deliver a high dose.

The above calculation is based on fentanyl patch data, which overestimates the potential exposure from drug in tablet or powder form in several ways. Drug must have sufficient surface area and moisture to be efficiently absorbed. Medicinal transdermal fentanyl utilizes a matrix designed to optimize delivery, whereas tablets and powder require dissolution for absorption. Relatedly, powdered drug sits on the skin, whereas patches have adhesive to hold drug in close proximity to the skin allowing both to remain moist. Finally, the above quoted figure 2.5 mcg/cm<sup>2</sup>/h represents delivery at steady state after drug has penetrated the dermis, which overestimates the amount of absorption in the first few minutes of dermal exposure. This initial period is of most relevance in unintentional exposure, because fentanyl that is observed on skin can be rapidly removed by mechanical (brushing) means or cleansing with water. Therefore, based on our current understanding of the absorption of fentanyl and its analogs, it is very unlikely that small, unintentional skin exposures to tablets or powder would cause significant opioid toxicity, and if toxicity were to occur it would not develop rapidly, allowing time for removal.

### **Ocular-Facial Exposure Risk for Fentanyl and Fentanyl Analogs**

Mucous membranes present opportunity for absorption of fentanyl and its analogs. Fentanyl, for example, exhibits greater than 30-fold absorption across mucous membranes when compared to skin, and is available in a formulation that utilizes transmucosal administration [27]. A healthy male veterinarian was splashed in the eyes and mouth with contents of a dart containing 1.5 mg of carfentanil and 50 mg xylazine. Despite immediately washing his face with water, he became drowsy within two minutes; he responded promptly to the administration of naloxone [28]. It is not clear to what extent these effects were a result of carfentanil exposure. Although facial contact with liquid or powder opioids is unlikely, OSHA rated splash protection would be sufficient to prevent mucous membrane exposure.

### **Naloxone**

Naloxone, a mu-opioid receptor antagonist, administered by parenteral, or intranasal routes, reverses opioid-related respiratory depression. The effective dose of naloxone depends on the patient's weight, amount of opioid to be reversed, and relative binding affinities at the mu receptor [8, 29]. There is scant information on human and animal naloxone reversal of fentanyl analogs. Despite anecdotal reports that higher-than-usual doses may be necessary [30], animal data suggest that standard doses of naloxone should be sufficient to reverse carfentanil [31]. While a detailed discussion of dosing and administration of naloxone is beyond the scope of this guideline, if a patient does not respond to 10 mg of naloxone, it is unlikely additional naloxone will be of value [29]. For patients who are hypoventilating and unresponsive to initial doses of naloxone, promptly assisting ventilation and oxygenation are recommended.

### **Recommendations**

The American College of Medical Toxicology and American Academy of Clinical Toxicology recognize the challenges in issuing recommendations where available data are incomplete. We believe that recommendations should be protective of emergency responders, but not result in unnecessary delays in care to patients with time-sensitive conditions. We also recognize that PPE can interfere with task performance by emergency responders and law enforcement officials. Due to the limited available data, the following recommendations primarily represent consensus expert opinion.

The position of ACMT and AACT, is as follows:

#### **General Precautions and Management of Exposure**

- Workers who may encounter fentanyl or fentanyl analogs should be trained to recognize the symptoms and objective signs of opioid intoxication, have naloxone readily available, and be trained to administer naloxone.
- For opioid toxicity to occur the drug must enter the blood and brain from the environment. Toxicity cannot occur from simply being in proximity to the drug.

- Toxicity may occur in canines utilized to detect drug. The risks are not equivalent to those in humans given the distinct contact that dogs, and not humans, have with the local environment.

#### Dermal precautions

- For routine handling of these drugs, nitrile gloves provide sufficient protection.
- In situations where an enclosed space is heavily contaminated with a potential highly potent opioid, water resistant coveralls should be worn.
- Incidental dermal exposures should immediately be washed with copious amounts of water. Alcohol based hand sanitizers should not be used for decontamination as they do not wash opioids off the skin and may increase dermal drug absorption.

#### Respiratory precautions

- In the unusual circumstance of significant airborne suspension of powdered opioids, a properly fitted N95 respirator or P100 mask is likely to provide reasonable respiratory protection.

#### Mucous Membrane/Splash Exposure

- OSHA-approved protection for eyes and face should be used during tasks where there exists possibility of splash to the face.

#### Naloxone Administration and Airway Management

- Naloxone should be administered to those with objective signs of hypoventilation from opioid intoxication.
- If hypoventilation persists following initial naloxone dose and personnel with advanced airway training are not available, repeat naloxone until reversal is seen or 10 mg is administered.
- Personnel with advanced airway training should provide airway support for patients who are in extremis or those who do not improve with naloxone.

#### Long-term Sequelae of Exposure

- In the absence of prolonged hypoxia, no persistent effects are expected following fentanyl or fentanyl analog exposures. Those with small subclinical exposures and those who awaken normally following naloxone administration will not experience long-term effects.

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# THE COP WHO SAID HE OD'D BY TOUCHING FENTANYL IS PROBABLY WRONG

By **Keegan Hamilton** Jul 14, 2017



You may have heard the story of the Ohio cop who nearly died from an overdose after accidentally touching the powerful synthetic opioid fentanyl with his bare hands.

The harrowing tale went viral two months ago after it was recounted by a local newspaper. Many national media outlets — including VICE News — also reported the officer's version of events: He collapsed after brushing some white powder off his shirt but was revived with the overdose antidote Narcan.

It was quite a story. But toxicology experts say such a scenario is, at best, highly unlikely.

And now, after a Harvard-affiliated doctor publicly called out the cop's story as “nonsense,” the Centers for Disease Control and Prevention and others have revised their guidelines for first responders who encounter synthetic opioids, backtracking on previous warnings that said merely touching fentanyl and similar drugs could be deadly.

Toxicology. “They don’t need to be if they take proper precautions.”

“A lot of police and firefighters are afraid to do their jobs.”

The police officer’s purported overdose incident happened May 12 in East Liverpool, Ohio. According to multiple reports, Patrolman Chris Green had been summoned to help arrest two suspected drug dealers when he found the inside of their vehicle coated in white powder; one of the men reportedly admitted it was fentanyl. When Green later returned to the police station, another officer noticed white powder on his shirt. The 32-year-old cop said he felt sick shortly after he used his fingers to wipe it off.

“I started talking weird,” Green told East Liverpool’s Morning Journal. “I slowly felt my body shutting down. I could hear them talking, but I couldn’t respond. I was in total shock. ‘No way I’m overdosing,’ I thought.”

The newspaper reported that Green collapsed about an hour later, though he later told the New York Times he hit the floor “within two minutes.” His fellow cops summoned an ambulance, and the next thing he remembers is waking up confused in the hospital surrounded by doctors, colleagues, and his worried fiancé.

Green was back on the job within a few days, delivering tough-talk messages to local dealers. “You are not coming to my town and peddling that poison,” he told local news outlet WKBN.

Green did not respond to an interview request for this story submitted by VICE News through another East Liverpool police officer.

The scary story of the hard-charging cop’s near-death encounter with fentanyl, a potent drug fueling America’s overdose epidemic, was too tempting for news outlets to resist. But when Dr. Jeremy Faust, an emergency physician at Boston’s Brigham and Women’s Hospital, a teaching affiliate of Harvard Medical School, heard about it on CNN, he wasn’t buying it.

ups or scrutiny of Green's story, Faust wrote a column for Slate that concluded, "The odds of an overdose from such a freak incident are infinitesimally small — if not strictly impossible." He spoke with several toxicologists who expressed deep skepticism at the notion that merely touching fentanyl could trigger an overdose.

"The odds of an overdose from such a freak incident are infinitesimally small — if not strictly impossible."

That conclusion, however, ran contrary to conventional wisdom. At the time, the CDC and the National Institute for Occupational Safety and Health (NIOSH) warned on their page about fentanyl that "exposure via inhalation or skin absorption can be deadly." In September, the DEA [released a video](#) that warned police officers around the country about the dangers of touching the drug.

"Fentanyl is being sold as heroin in virtually every corner of our country," said Jack Riley, the DEA's acting deputy administrator. "A very small amount ingested, or absorbed through your skin, can kill you."

But earlier this week, the CDC and NIOSH updated the [fentanyl page](#) on their website to remove the statement "skin absorption can be deadly." It now says that "while dermal absorption of fentanyl commonly occurs through prescribed use of the drug, inhalation of powder is the most likely exposure route for illicitly manufactured fentanyl."

Stephanie Stevens, a spokesperson for the CDC and NIOSH, said the change was made after the agency's staff determined "there was not enough evidence to validate the statement that dermal exposure to fentanyl is deadly." Stevens noted that there is "limited research" on the subject, and said the CDC is "actively looking to study and better understand" the health risks of skin exposure to fentanyl.

On Wednesday, the American College of Medical Toxicology issued a new position statement on the drug, stating that "incidental dermal absorption is unlikely to cause

The American College of Medical Toxicology notes that emergency responders who think they've overdosed from touching fentanyl have previously "described nonspecific findings" such as "dizziness" or "feeling like body shutting down," but not common overdose symptoms like respiratory depression.

The concern for Faust, Stolbach, and others is that Green's story will create unfounded fears and discourage cops around the country from administering Narcan to overdose victims.

"There is such a thing as being too careful," Faust said. "I don't want first responder and everyday citizen heroes to not save lives because they've been misinformed about these compounds."

Although the CDC's website no longer states that touching fentanyl could be deadly, the DEA has no plans to amend its warning to police officers about fentanyl. "As far as we're concerned, any risk is too much," DEA spokesperson Katherine Pfaff told VICE News. "We're not going to change how we advise law enforcement officers to handle fentanyl. It's extremely dangerous."

█ "This stuff is as dangerous as anthrax."

After his incident, Green filmed a training video that is now required viewing for police officers in Columbus, Ohio, about how to handle fentanyl in the field.

"We're going to have to answer calls and traffic stops in biohazard suits, or a lot of us are going to end up dead," Green told the New York Times. "This stuff is as dangerous as anthrax."

For toxicology experts like Stolbach, such claims are absurd. While fentanyl and similar drugs are indeed extremely potent — and often fatal — when injected, smoked, or inhaled, he said he'd have no qualms about touching synthetic opioid powder.

"If I touched it with my bare hands, I would casually walk over to the sink and wash it off," Stolbach said. "I wouldn't think twice about it."

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# Can Just Touching Fentanyl Cause An Overdose?

By Zachary Siegel (/bio/zachary-siegel) 07/11/17

Medical experts weigh in after a police officer reportedly overdoses from brushing fentanyl off his clothing.



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You probably heard the story about the Ohio police officer who said he overdosed after brushing away illicit fentanyl that somehow landed on his clothes. After all, it spread like wildfire (<http://www.nbcnews.com/storyline/americas-heroin-epidemic/fentanyl-crisis-ohio-cop-accidentally-overdoses-during-drug-call-n759741>).

But what you may have missed were the numerous medical experts, from doctors to forensic toxicologists, suggesting how preposterous such a scenario is.

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Officer Chris Green of East Liverpool Police Department told *CBS News* (<http://www.cbsnews.com/news/fentanyl-nearly-kills-officer-chris-green-after-drug-arrest-ohio/>) that he helped arrest two men on suspected drug charges. Apparently, a white powdery substance was on the floor of their car.

Then a fellow officer alerted him that white powder was on his sweatshirt. "Yeah, um, as I walked through the door, I was almost pulled back by an alert colleague, another officer, 'what's this white powder'... that's when I reached back and accidentally came in contact," Green said.

After realizing powder was on his person, according to Green's account, "I fall backwards and I'm trying, trying to hold on to anything I can grasp."

"I was in total shock," Green told (<http://www.morningjournalnews.com/news/local-news/2017/05/traffic-stop-almost-turns-deadly-for-elo-officer/>) East Liverpool's local paper. "No way I'm overdosing," I thought."

Dozens of toxicologists actually agree with Green, that there is "no way" he overdosed from touching fentanyl.

"Neither fentanyl nor even its uber-potent cousin carfentanil (two of the most powerful opioids known to humanity) can cause clinically significant effects, let alone near-death experiences, from mere skin exposure," writes

([http://www.slate.com/articles/health\\_and\\_science/medical\\_examiner/2017/06/toxicologists\\_explain\\_](http://www.slate.com/articles/health_and_science/medical_examiner/2017/06/toxicologists_explain_) *Slate's* Jeremy Faust, an emergency medicine physician at Brigham and Women's Hospital in Boston and a clinical instructor at Harvard Medical School. "If Green's story is true, it would be the first reported case of an overdose caused solely by unintentional skin contact with an opioid."

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David Juurlink, the University of Toronto's head of clinical pharmacology and toxicology, told *CBC* (<http://www.cbc.ca/radio/asithappens/as-it-happens-tuesday-edition-1.4189447/toxicologist-casts-doubts-on-ohio-officer-s-claim-he-od-d-by-touching-fentanyl-1.4189449>) that Green isn't necessarily lying about the incident. But, he said, "It's really, really difficult to imagine that transient exposure of the skin to fentanyl would cause someone to overdose."

Juurlink could only speculate: "Maybe his finger ended up in his mouth, or who knows? But we do know that fentanyl is absorbed much more easily across mucosal surfaces like the mouth than it is through the skin."

Green remained unconscious after he was given one dose of naloxone at the station. He was then rushed to the hospital where he received three more doses until finally coming to. If an opioid overdose does not respond (<https://www.thefix.com/narcan-resistant-fentanyl-fact-or-fiction>) to four doses of naloxone, then maybe it's not an opioid overdose at all.

Illicit fentanyl and its numerous chemical cousins are indeed scary. They're new(ish) to drug markets and there is much we still don't know about them. Which makes the officer's response—scared, panicked—totally reasonable. He's on the front lines of a deadly drug crisis. Perhaps he suffered an anxiety attack? Who knows.

But these are questions and scenarios the media failed to ask. Instead, they uncritically picked up the story and ran with it without first asking: is this even possible?

It's yet another sign media is falling into old, tired patterns: stoking drug hysteria.

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## On Fire and EMS

with [Sarah Calams](#)

# Fact or fiction: Transdermal fentanyl exposure

**For opioid toxicity to occur the drug must enter the blood and brain from the environment**

Jul 26, 2017

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The opioid epidemic has created panic not only among medical professionals, but boots on the ground first responders as well.

According to the [American Society of Addiction Medicine](#), drug-related overdoses are the [leading cause of accidental death](#) in the U.S. In 2015, according to the ASAM, there were 52,404 fatal drug overdoses, with 20,101 overdose deaths related to prescription pain relievers and 12,990 overdose deaths related to heroin.

The statistics are startling and overdose deaths continue to rise as the opioid epidemic becomes more widespread. And even though the epidemic is not a new issue, it is creating challenges for the first responders on scene of potential opioid-related overdose calls.





Seized fentanyl in powder form. (Photo/Drug Enforcement Administration)

## EXPOSURE TO RESPONDERS

In Bucks County, Pennsylvania, [two paramedics, an EMT and a deputy fire chief](#) were hospitalized after experiencing what they said were carfentanil exposure-related symptoms while treating a patient in an ambulance.

Newtown Ambulance Squad Chief of Operations Evan Resnikoff [wrote on July 18](#) that crews responding to a cardiac arrest call arrived on scene to find the patient had already been revived by two bystanders – a nurse and deputy fire chief. Another bystander had administered a dose of naloxone. While treating the patient in the ambulance, the responders started complaining of symptoms, including altered mental status, tachycardia, diaphoresis, hypertension and nausea. The responders were taken to a hospital and have since fully recovered.

"It is believed the crew was exposed to a narcotic in powder form from either the interior of the vehicle or from the patient," Resnikoff wrote on Facebook.

And this instance is not the only example of alleged transdermal exposure.

In East Liverpool, Ohio, a [police officer said he nearly died](#) during a traffic stop after coming in contact with fentanyl. The officer was attempting to pull over a driver who was allegedly conducting a drug deal. The driver had warrants for possession of carfentanil; the driver rubbed a white powder into the floor of the car when the officer attempted to pull him over. The powder was later confirmed as fentanyl.

After the arrest, the officer started feeling ill and an ambulance was called. The officer fell to the floor and the crew administered naloxone; he was treated at the hospital and later released.

Last year, in Winnipeg, Manitoba, a [firefighter-paramedic was given naloxone](#) after allegedly being exposed to fentanyl during a medical call. Crews were responding to a possible fentanyl overdose when the firefighter-paramedic said he started experiencing respiratory distress.

When crews made it back to the station, paramedics administered naloxone to the firefighter-paramedic; he made a full recovery and has since returned to work.

These stories are just a snapshot of what responders say is happening due to transdermal exposure. But, is that what is really happening?

## **SCIENCE SAYS 'NO'**

The [American College of Medical Toxicology](#) and [American Academy of Clinical Toxicology](#) released a [position statement](#) on transdermal fentanyl exposure. The position, based on the opinion and clinical experience of ACMT and AACT task force members, states "the risk of clinically significant exposure to emergency responders is extremely low."

Furthermore, the ACMT and AACT said they have not seen reports of responders developing symptoms consistent with opioid toxicity from brief, incidental contact with opioids. Responders have reported exposure symptoms that include dizziness, feeling like their body was shutting down and as if they were dying. The symptoms, however, did not point to signs of opioid toxicity, which include respiratory depression, according to the ACMT and AACT.

"Incidental dermal absorption is unlikely to cause opioid toxicity," the position says.

The position paper notes that for dermal exposure risk it "would take approximately 14 minutes to receive 100 mcg of fentanyl." The example, they said, "illustrates that even a high dose of fentanyl prepared for transdermal administration cannot rapidly deliver a high dose."

The absorption of fentanyl is unlikely to cause "significant opioid toxicity" during brief, incidental exposure.

"If toxicity were to occur, it would not develop rapidly, allowing time for removal," the position says. "For opioid toxicity to occur the drug must enter the blood and brain from the environment. Toxicity cannot occur from simply being in proximity to the drug."

[Dr. David K. Tan](#), an associate professor and chief of EMS in the division of emergency medicine at [Washington University School of Medicine](#) in St. Louis and board-certified in emergency medicine and EMS medicine, shares the same viewpoint of the ACMT and AACT.

## **A MEDICAL OPINION**

Dr. Tan, discussing transdermal fentanyl exposure, agrees that exposure as would be typically encountered by first responders is an extremely low risk.

"It is not zero risk and certainly not impossible, but extremely low," he said.

In regard to the Winnipeg firefighter-paramedic's documented opioid-related exposure, Dr. Tan said respiratory distress is described as the presenting sign.

"I don't know if that meant breathing fast and gasping – which is what first comes to mind – or stopped breathing," he said. "In which case respiratory distress would generally not be the presenting sign and lethargy/coma would appear first in general."

Dr. Tan noted that many other exposure-related articles describe symptoms as anxiety, hypertension and feeling "funny."

"None of these are suggestive of the opiate toxidrome of lethargy or coma, pinpoint pupils and apnea or respiratory depression," he said. "I'm not sure what they're experiencing, but it doesn't sound like an opiate overdose."

Dr. Tan explained that symptoms of opiate exposure include drowsiness or lethargy often to the point of a coma, lowered or sporadic respirations to the point of apnea and pinpoint pupils.

Additionally, Dr. Tan said carfentanil, which is more potent than fentanyl, must reach the bloodstream in order to produce any effect.

"From what we know today, merely touching carfentanil with intact skin, no mucous membrane or inhalation exposure, will not suddenly be deadly," he said.

Dr. Tan also cautioned that naloxone should not be administered because a responder comes in contact with opioids.

"It should really be reserved for someone who becomes symptomatic with opiate toxidrome from an actual exposure," he said.

Mitigation of known risk is important, added Dr. Tan.

"Standard safety precautions for all unknown liquids and powders are always good practice," he said. "Adding appropriate PPE for the circumstances is reasonable."

## **SAFETY MEASURES**

Personal protection equipment, the statement said, helps reduce the risks of occupational exposures.

For dermal precautions, the ACMT and AACT said nitrile gloves should be used when handling drugs, water-resistant coveralls should be worn in a space that's heavily contaminated with opioids and exposures should be immediately washed with water.

"We also recognize that PPE can interfere with task performance by emergency responders and law enforcement officials," the position statement says.

For airborne suspension of opioids, a N95 respirator is reasonable for any concern of aerosolization of potent compounds, Dr. Tan said. A P100 mask, according to the position statement, will also provide respiratory protection. In addition, eye and face protection should be used when the possibility of splash to the face exists.

"Law enforcement and EMS must balance safety with mobility and efficiency when entering and securing potent scenes where drugs are used, distributed or produced," the position statement says.

For responders who may be exposed to opioids while on scene, it's important to wear the correct PPE, be armed with the knowledge to recognize the symptoms of opioid intoxication, have naloxone readily available and crews properly trained to administer the overdose-reversing drug if the situation warrants it.

### [ACMT and AACT Position Statement](#)

#### **ACMT and AACT Position Statement: Preventing Occupational Fentanyl and Fentanyl Analog Exposure to Emergency Responders**

The position of the American College of Medical Toxicology (ACMT) and American Academy of Clinical Toxicology (AACT), is as follows:

Fentanyl and its analogs are potent opioid receptor agonists, but the risk of clinically significant exposure to emergency responders is extremely low. To date, we have not seen reports of emergency responders developing signs or symptoms consistent with opioid toxicity from incidental contact with opioids. Incidental dermal absorption is unlikely to cause opioid toxicity. For routine handling of drug, nitrile gloves provide sufficient dermal protection. In exceptional circumstances where there are drug particles or droplets suspended in the air, an N95 respirator provides sufficient protection. Workers who may encounter fentanyl or fentanyl analogs should be trained to recognize the signs and symptoms of opioid intoxication, have naloxone readily available, and be trained to administer naloxone and provide active medical assistance. In the unlikely event of poisoning, naloxone should be administered to those with objective signs of hypoventilation or a depressed level of consciousness, and not for vague concerns such as dizziness or anxiety. In the absence of prolonged hypoxia, no persistent effects are expected following fentanyl or fentanyl analog exposures. Those with small subclinical exposures and those who awaken normally following naloxone administration will not experience long-term effects. While individual practitioners may differ, these are the positions of American College of Medical Toxicology and American Academy of Clinical Toxicology at the time written, after a review of the issue and scientific literature.

#### **Background**

Fentanyl and fentanyl analogs are potent opioid receptor agonists. Fentanyl and its analogs are increasingly implicated in overdose and death in North America among illicit opioid users. The reported mortality from synthetic opioids rose 72.2% (to 9,850) from 2014 to 2015 [1]. Due to limitations in identifying analogs, this figure likely underrepresents death from these drugs. Fentanyl analogs are distributed in North America both as

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## About the author

Sarah Calams previously served as Associate Editor of EMS1. In addition to her regular editing duties, Sarah delved deep into the people and issues that make up the EMS industry to bring insights and lessons learned to EMS providers everywhere.

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## Scene Safety and Force Protection in the Era of Ultra-Potent Opioids

Michael J. Lynch, Joe Suyama & Francis X. Guyette

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# SPECIAL CONTRIBUTION

## SCENE SAFETY AND FORCE PROTECTION IN THE ERA OF ULTRA-POTENT OPIOIDS

Michael J. Lynch, MD, Joe Suyama, MD, Francis X. Guyette, MD, MPH

### ABSTRACT

Ultra-potent opioids (fentanyl, carfentanil) are now widely available and fueling an epidemic of overdose. First responders are increasingly exposed to these potent narcotics necessitating guidance for scene safety and force protection from medical directors. Reports in lay media have sensationalized accounts of exposure and harm that may lead providers to fear providing care to patients suspected of opioid overdose. The likelihood of prehospital providers suffering ill effects from opioid exposure during routine emergency medical services (EMS) operations is extremely low. We propose recommendation to assist medical directors in providing guidance and education to their providers minimizing the risk of provider exposure while allowing the delivery of prompt and appropriate care to patients with suspected overdose.

**Key words:** overdose; scene safety; carfentanil; PPE

PREHOSPITAL EMERGENCY CARE 2018;22:157–162

### INTRODUCTION

Overdose deaths from opioids have reached epidemic proportions in the United States. According to the Centers of Disease Control and Prevention (CDC), there were 52,404 drug overdose deaths in 2015 with 33,091 from opioids.<sup>1</sup> More than 500,000 Americans died from unintentional drug overdose since 1999 making overdose the leading cause of accidental injury

death in the United States.<sup>2</sup> This trend was initially driven by prescription opioid misuse, but has since been supplanted by inexpensive and potent heroin and illicit synthetic opioids.<sup>1</sup> While prescription opioid deaths have remained relatively stable since 2011, deaths related to heroin and illicit synthetic opioids (including fentanyl, carfentanil, and its derivatives) rose by 20.6% and 72.2%, respectively, with 2015 representing the first year in which illicit opioid overdose deaths surpassed prescription opioid deaths.<sup>2</sup> Representative of many communities in the United States, Pennsylvania's Allegheny County, reported fentanyl related deaths surpassing heroin deaths for the first time in 2016<sup>3</sup> (Figure 1). The 2016 DEA Emerging Threat Report identified 15 synthetic opioid and fentanyl analogues including carfentanil and U-47700. Of those 15, nine were reported for the first time in 2016.<sup>4</sup> These findings demonstrate the rapid evolution of available opioids and the surge of potent fentanyl analogues with an associated increase in mortality (Figure 2).

Medical and law enforcement first responders have anecdotally reported observations related to the increasing variety and potency of synthetic opioids which they have encountered. First, it has been widely, though anecdotally, reported that higher doses of naloxone are required to achieve reversal of higher potency synthetic opioids.<sup>5</sup> Furthermore, although naloxone has continued to be effective in the management of acute opioid toxicity even in these settings, physical contact between victims and first responders is anticipated due to the need for basic life support while awaiting the effects of naloxone.<sup>6,7</sup> Popular media reports describe law enforcement exposures to synthetic opioids and potential toxicity requiring treatment. A minimal amount of peer-reviewed data exists to inform definitive guidelines for first responder safety. We propose recommendations for first responder force protection based upon pharmacologic understanding of fentanyl as well as recently growing clinical experience with the breadth of synthetic drugs.

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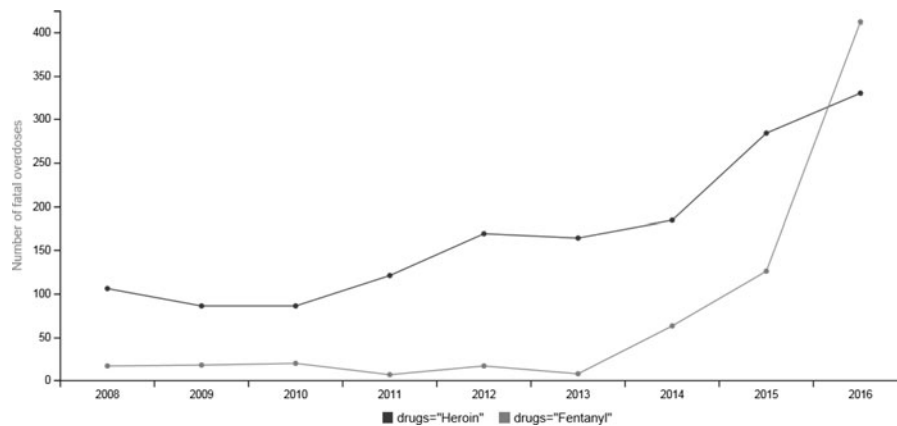


FIGURE 1. Opioid related deaths in Allegheny County, Pennsylvania 2008–2016 Adapted from Karl Williams, MD, 2017. Opioid Related Deaths in Allegheny County <https://www.overdosefreepa.pitt.edu/know-the-facts/view-overdose-death-data/> downloaded on June 25, 2017 (Used by permission).

### FENTANYL PHARMACOLOGY

Fentanyl and its analogues are primarily injected or ingested through contact with mucous membranes (snorting). Transdermal delivery of fentanyl has been described and developed for decades, however, crystallized or powdered fentanyl has markedly diminished absorption and systemic availability.<sup>8</sup> Fentanyl has demonstrated relatively favorable skin permeation characteristics, but requires pharmaceutical delivery mechanisms to achieve meaningful systemic levels.<sup>9</sup> In order to promote diffusion across epidermal skin layers in patch formulation, fentanyl is typically produced in an alcohol-based solution and gelled with hydroxyethyl cellulose.<sup>10</sup> Small studies of occupational exposure in pharmaceutical production workers loading, filtering, drying, and packaging large amounts of powdered fentanyl have shown dermal absorption of clinically insignificant levels of fentanyl following prolonged exposure.<sup>11,12</sup> The primary sites of skin exposure to fentanyl were the hands and distal forearms.<sup>12</sup> Factors such as temperature and skin integrity contribute to absorption, as well.<sup>13</sup> Oral and nasal mucosal absorption of liquid and solid form fentanyl is

well established with a variety of existing pharmaceutical products including effervescent, sprays, lollipops, and lozenges.<sup>14,15</sup> Specific absorption and pharmacokinetic data are limited for carfentanil and other emerging synthetic opioids; however, a study of sufentanil indicated similar absorption characteristics.<sup>16</sup>

Industrial production and pharmacokinetics of fentanyl would indicate that there is a theoretical risk of skin absorption; however, rapid absorption of crystallized or powdered fentanyl or fentanyl derivative outside of solution is unlikely. Extended contact, particularly in the presence of diaphoresis, elevated temperature, or defect in the skin may potentially increase the likelihood of absorption.<sup>16</sup> The use of ethanol based hand sanitizers in the field may cause increased transdermal absorption of powdered fentanyl on the skin, and cannot be recommended for use under these circumstances. Copious amounts of water and a mild detergent are suggested to eliminate suspected fentanyl contamination or to remove bodily fluid contamination. Mucous membrane exposure due to airborne dust, while more likely to result in drug absorption, is uncommon.<sup>12</sup>

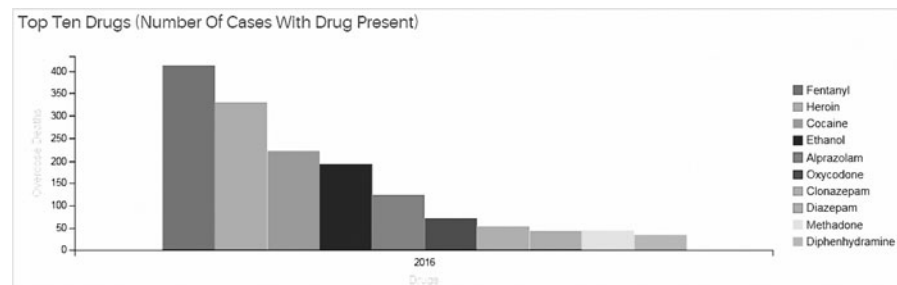


FIGURE 2. Etiology of overdose deaths in Allegheny County, Pennsylvania. Adapted from Karl Williams, MD, 2017. Etiology of Overdose Deaths in Allegheny County, PA <https://www.overdosefreepa.pitt.edu/know-the-facts/view-overdose-death-data/> downloaded on June 25, 2017 (Used with permission).

## PREHOSPITAL EXPOSURE

Occupational data during fentanyl pharmaceutical production is not necessarily indicative or predictive of prehospital risk. Much smaller quantities of drug are present in the prehospital environment. Handling of drugs is inadvertent, brief, and relatively uncommon. At the same time, the formulation of illicit powder is extremely variable with individual drug constituents unknown to the responder. Increasingly potent fentanyl derivatives are now widely available and the specific pharmacological and pharmacokinetic properties of the various drugs are less well known than those of pharmaceutical fentanyl. These factors plus the wide range of situations in which providers may find themselves makes universally applicable guidelines difficult to develop.

Occupational exposure by first responders and law enforcement fall primarily into two categories: 1) healthcare response to a presumed overdose or other emergency medical condition and 2) confiscation of drug evidence as part of operational law enforcement activities. The latter scenario typically is less time dependent allowing for environmental investigation and hazardous materials protocols to be applied. Regardless of the type of occupational exposure, maintaining a standard protective posture based upon a hierarchy of controls is of fundamental importance.<sup>17</sup>

This paper will primarily focus on the first group in which providers are responding to a presumed medical emergency and the administrative and personal protective stance needed to manage the scene when elimination or isolation of the hazard is not possible. In either case, safety of the responders is of paramount importance.

## SCENE ASSESSMENT

As with any emergency response, a careful scene safety assessment is necessary with particular attention to identification of visible powder or other drug related paraphernalia. Whenever possible, powdered or packaged drug should not be handled or disrupted by responders. At no time should providers attempt to identify the substance by tasting or touching the material. Environments in which unidentified powder is visible should be exited as soon as it is reasonably safe. However, visible powder without evidence of disruption or airborne dust should not preclude identification, removal, and standard treatment of a victim. Cases in which powder has clearly been disrupted and dust particles are identified are rare but should prompt careful evaluation of the scene and danger to personnel. Principles of time, distance, and shielding (in this case barrier devices associated with universal precautions including gloves, long sleeves, and pants, and a particulate [N95] mask) should be utilized to minimize

exposure. When multiple victims are identified, particularly when there are no unaffected individuals at the scene, alternative scenarios such as carbon monoxide exposure, hydrogen sulfide, or other toxic gases should be considered. Great caution should be taken as well as consideration of higher levels of PPE including full skin and mucosal coverage. Individual scenarios will vary and on-scene responders will need to determine the level of perceived threat. These rare situations should not prevent normal response to routine emergency calls. Universal precautions (gloves, masks, eye protection when indicated) should be followed and would be expected to prevent toxic exposure to illicit drugs in nearly all circumstances. While published data regarding first responder safety with the advent of highly potent opioid derivatives do not exist, the widespread national availability of these drugs combined with the infrequent reports of emergency medical responder, drug dealer, and illicit drug lab exposure incidents are encouraging that routine performance of these activities is unlikely to result in toxicity. Much like handling a dirty bomb scenario, first responders should understand the risks of inhalation or ingestion of this material and take adequate steps to prevent this from happening.

## PERSONAL PROTECTIVE EQUIPMENT

Pharmacologic properties of fentanyl and occupational exposure data suggest that use of a single pair of nitrile gloves would be expected to prevent inadvertent absorption of fentanyl and its derivatives when there is no evidence of visible powder. Simultaneous donning of multiple pairs of gloves is not necessary. Following the therapeutic encounter, gloves should be immediately removed and disposed of in an appropriate medical waste container to prevent accidental secondary exposure. More extensive coverage may be necessary if free powder is visualized. Normal universal precautions should otherwise be followed.

Management of a patient who is presumed to be suffering toxicity from an opioid including fentanyl derivatives should not routinely require use of a mask. While aerosolized dust may be anticipated following disruption of free powder, medical care of a patient who has injected, snorted, or otherwise ingested any type of opioid would not be expected to result in airborne drug particles. Therefore, we do not recommend routine use of masks of any kind for medical response to a potential overdose.

When a small amount of free powder is identified, caution should be taken to avoid touching or disturbing the powder. In the prehospital setting, it is unlikely that the provider will know the composition of the powder. Universal precautions should be taken and the powder essentially treated as a body substance such that any contact is avoided, no bare skin



contact is permitted, and inadvertent contact should result in immediate cleansing of the area with copious water or saline irrigation to flush away any contaminant. Ethanol-based sanitizers should be avoided as they could potentially enhance skin absorption. Even in the presence of a small amount of visualized powder, a mask is unlikely to be necessary if it remains undisturbed.

There are no data regarding the ideal type of mask to prevent oral and nasal mucosal exposure to heroin and synthetic opioids. Airborne fentanyl or other synthetic analogues, when present, would be expected to be a dust rather than a gas or fume. While carfentanil has been implicated in gas attacks, this was a weaponized preparation, not the street level drug, primarily found as a powder, pressed into pill form, or in liquid solution.<sup>18</sup> Dust from the disruption of powdered drug is likely the primary source of respiratory or mucous membrane exposure. In this case, a simple surgical mask would likely provide a barrier to dust particles; however, in order to provide a more complete seal to a provider's face, an N-95 mask would be expected to prevent nearly all oral and nasal exposure. In environments with significant risk of airborne contact as in a manufacturing facility, following deployment of an explosive (as was reported in Connecticut following use of a stun grenade),<sup>19</sup> or other disruptive forces such as fans, it is reasonable to consider full body and face coverage as is recommended by the National Institute for Occupational Safety and Health (NIOSH).<sup>20</sup> Environmental exposure to airborne powder or aerosolized drug is more likely to be encountered during the course of law enforcement operations rather than primary medical response. However, if such an environment were to be encountered by medical responders, it would be prudent to attempt to remove victims from the scene, if assessed to be safe, and retreat from the area until further investigation and resources, including potentially a Hazardous Material team, can be activated.

Popular media reports of possible law enforcement exposure and toxicity have included removal of dust from clothing. Clothing should act as an appropriate barrier to direct skin contact, however, secondary exposure through hand contact or production of dust is unlikely but possible. If powder or dust is identified on clothing, a disinfectant wet wipe should be used with a gloved hand to remove it. Using a wetted wipe will prevent significant aerosol of dust and disinfectant wet wipes have been shown to remove approximately three times more dust from skin than water-based ones.<sup>12</sup> Following dust removal, clothing should be carefully removed and laundered at the first opportunity. Additionally, after any shift in which potential contact with a drug could have been made, clothing should be removed and washed as soon as possible to prevent a potential, though very unlikely, secondary

exposure. Similarly, the provider should change into a clean pair of gloves prior to doffing a mask to avoid inadvertent contamination of mucous membranes. If there is any concern for external contamination the provider should shower as soon as is practicable.

## PATIENT CARE CONSIDERATIONS

While larger doses of naloxone have been widely, though anecdotally, reported necessary to reverse toxicity from potent opioids and fentanyl analogues, naloxone is still appropriate and effective therapy.<sup>5</sup> The reported "resistance" to naloxone is likely multifactorial. Rising potency and receptor binding potential of newer analogues can certainly contribute to dose requirements. Other factors may include exposure to non-opioid sedatives; administration of naloxone after anoxic brain injury and other secondary organ dysfunction that has already occurred; larger initial doses and increased frequency of administration with higher dose nasal formulations; and incomplete understanding of appropriate endpoints of treatment being reversal of respiratory depression and not necessarily arousal. Regardless, naloxone administration with dose escalation when no response is observed within 2–3 minutes remains the appropriate pharmacologic intervention and should be employed by first responders and bystanders, when available. First responders and lay rescuers should place emphasis on activation of the EMS system and escalation of care with the intent to expedite transport to definitive medical care. At the same time, the primary risk to opioid overdose victims is respiratory depression with associated hypoxemia and hypercapnia. Therefore, in situations where respiratory depression is observed, assisted ventilation should be initiated at the earliest opportunity with or without naloxone administration. Ventilation should not be delayed while administering naloxone or awaiting a response. Fentanyl and other opioids are not exhaled. Bag valve mask ventilation or barrier-assisted rescue breathing will not result in secondary provider toxicity while managing a patient who has suffered an opioid overdose. However, if there is visible drug on a patient's face, it is appropriate to remove the powder with a gloved hand prior to initiation of ventilation.

## PROVIDER EXPOSURE

There has been understandably growing concern about responder safety with the advent of a diverse array of potent opioids available on the streets throughout the country. Anecdotal stories of law enforcement exposure have been reported in popular media. It is important to note that while these reports are troubling, exposure and toxicity have not been verified in peer-reviewed publications. Symptoms described in media accounts are not consistent with anticipated

opioid toxicity, but complete descriptions of medical outcomes are publicly unavailable. We are not aware of any substantiated accounts of medical responder exposures resulting in toxicity and our goal is to maintain the safety of first responders. In addition to preventing exposure, plans should be in place to manage a potential responder exposure. Providers should work in pairs whenever possible to maximize the likelihood that immediate recognition and care for an exposure incident can occur. Symptoms of opioid exposure include euphoria, nausea, lightheadedness, sedation, coma, and respiratory depression. As in caring for patients, the first response to a symptomatic exposure should be the activation of additional healthcare providers and immediate transportation to a healthcare facility for observation, diagnosis, and management of an exposure or other acute health issue. Cardiac monitoring, pulse oximetry, and nasal capnometry should be applied when available. Naloxone administration is recommended for the treatment of sedation with respiratory depression. Most law enforcement officers have been cautioned to no longer perform field testing in accordance with Drug Enforcement Administration (DEA) recommendations. Likewise, medical first responders should not handle drugs or paraphernalia, although documentation of those products can be valuable for providers as well as public health surveillance. Drug related evidence should be left for appropriate forensic collection by law enforcement.

## SUMMARY AND RECOMMENDATIONS

Environmental exposure to potent opioid products by medical and law enforcement first responders is a growing concern in the United States. Popular reports of law enforcement and first responder exposure have not been confirmed as resulting in opioid toxicity as described symptoms have not generally corresponded to anticipated symptoms. However, the risk requires evaluation and preparation to prevent a potential threat to first responders who work in uncertain and difficult environments. Specific evidence to guide prevention and response is not available, but recommendations based upon recent experience and known pharmacologic and occupational information can be made pending development of more rigorous scientific evaluation. The following recommendations are based upon published pharmacokinetic data, limited occupational safety literature, and clinical experience of the authors in caring for overdose patients, directing EMS agencies, and supervising hazardous materials medical response teams. However, specific investigation of the extent to which first responder and EMS activity may result in exposure, absorption, or potential toxicity has not been published and represents an opportunity for future research. A position statement from the

American College of Medical Toxicology and American Association of Clinical Toxicologists that was concurrently and separately written and reviewed has come to similar conclusions.<sup>20</sup>

## WE RECOMMEND

1. Careful scene safety assessment with particular attention to the presence of drugs, unidentified powders, and drug paraphernalia.
2. Identification of multiple casualties, large amounts of free powder, or visibly aerosolized dust should:
  - a. Prompt rapid exit from the scene with retrieval of victims for treatment whenever possible.
  - b. Assess for alternative exposures (CO, HS, toxic gases or other toxins).
  - c. Consider law enforcement and/or hazardous materials team activation.
3. A single pair of nitrile gloves should be used while caring for any patient including an overdose victim. Handwashing with soap and water at the completion of care should be performed.
4. Follow standard universal precautions, treating unidentified powder or drug like blood.
5. We do not recommend routine use of masks for medical response.
6. Unpackaged drug/powder (as opposed to remnant of use or packaged products) may prompt consideration of N-95 masks, eye protection, and skin coverage (e.g. long sleeves and pants or paper gowns if there is concern for potential aerosol exposure; otherwise these additional PPE are unnecessary).
7. When there is a high likelihood of aerosolized dust, full skin and face coverage as recommended by NIOSH is appropriate.
8. Dust exposure to skin should be managed by rapidly flushing the exposed area with a large volume of water or saline.
9. Dust exposure to clothing should prompt wiping with an alcohol-based wipe and gloved hand followed by immediate laundering of clothing.
10. Clothing worn during a shift in which exposure could have occurred should be laundered at the first opportunity with limited secondary contact.
11. The provider should shower as soon as is practicable following exposure to skin or clothing.
12. Immediate initiation of assisted ventilation for any patient with respiratory depression.
13. Administration of naloxone to potential victims of opioid toxicity following system protocols. **Do not** delay assisted ventilation while administering naloxone or awaiting effect.
14. Visible dust or drug on a victim's face should be wiped away prior to assisted ventilation.
15. Providers should work in pairs whenever possible.

16. Provider exposure is extremely unlikely, but in the event of suspected exposure:
  - a. Activate back up resources.
  - b. Perform assessment and monitoring of the provider.
    - i. Monitor respiration.
    - ii. Evaluate pupil size.
  - c. Facilitate transportation to the nearest health-care facility as soon as possible.
  - d. Administration of naloxone with any signs of sedation, particularly with respiratory depression.
  - e. Prophylactic administration of naloxone is not recommended.
17. Drugs, paraphernalia, unidentified powders, and other substances should not be handled unless the provider is trained to do so safely.

It is critical to maintain the safety of our responders without unnecessarily compromising the care of potential victims. Research to better understand the potential risks and preventive measures may include further pharmacokinetic evaluation of illicit opioids with a focus on absorption, occupational exposure surveillance of healthcare and law enforcement personnel, and specific evaluation of different levels of personal protective equipment in a variety of real world settings.

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