HHE Health Hazard® Evaluation Program

Evaluation of Occupational Exposures to Illicit Drugs During a Law Enforcement and Emergency Medical Services Response

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Disclaimer

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Availability of Report

Copies of this report have been sent to the employer and employees at the Sheriff's Office and the Fire and Rescue Department. The state and local health department and the Occupational Safety and Health Administration Regional Office have also received a copy.

Recommended Citation

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Introduction

Request

In March 2018, a county Sheriff's Office and Fire and Rescue Department requested a health hazard evaluation (HHE) concerning unintentional exposure to illicit drugs (including opioids such as fentanyl and its analogues) during a joint law enforcement and fire and rescue response to a 911 call on March 1–2, 2018. The call was about a drug overdose at a private residence. Nine responders developed adverse health effects during the incident.

Background

According to the Centers for Disease Control and Prevention, there has been a 100% increase in the rate of overdose deaths involving synthetic opioids (which includes fentanyl and its analogues) in the United States from 2015 to 2016. It is becoming more common to find illicit fentanyl and its analogues mixed with other drugs, especially cocaine. This has raised concerns about the potential for unintentional exposure to illicit drugs among law enforcement officers, fire fighter-emergency medical services (EMS) providers, and other emergency responders in the course of their work.

To learn more about the workplace, go to Section A in the Supporting Technical Information

Our Approach

On March 13–14, 2018, we visited the Sheriff's Office and Fire and Rescue Department.

- We interviewed six fire fighter-EMS providers and three deputy sheriffs who underwent medical evaluation after the March 1–2, 2018 response.
- We spoke with emergency department (ED) staff at the hospital where the nine responders were evaluated.
- We also spoke with three members of the Fire and Rescue Department command staff and a member of the county emergency communications center.

We also reviewed relevant records:

- Narratives about the incident from the Sheriff's Office and the Fire and Rescue Department.
- Medical records from the ED related to the incident for the nine responders.

To learn more about our methods, go to Section B in the Supporting Technical Information

Our Key Findings

Deputy sheriffs and fire fighter-EMS providers responded to a 911 call about an overdose

- On March 1, 2018, three deputy sheriffs and six fire fighter-EMS providers responded to a 911 call. The call was about an unconscious person (Victim 1) with possible drug overdose in a private residence.
- Victim 1 likely experienced an opioid overdose.
    - Victim 1 was described as unresponsive, cyanotic (blue), and breathing slowly and "inconsistently."
    - Victim 1's condition improved with intranasal and intravenous naloxone.
- Other civilians at the scene were described by the responders to be under the influence of unknown substances. The activity at the residence was described as a "pill party."
- One of the other civilians on the scene (Victim 2) also received naloxone, with reported improvement in clinical condition.
- Victim 1, Victim 2, and another civilian (Victim 3) were transported to the ED for care.

Responders experienced work-related health effects

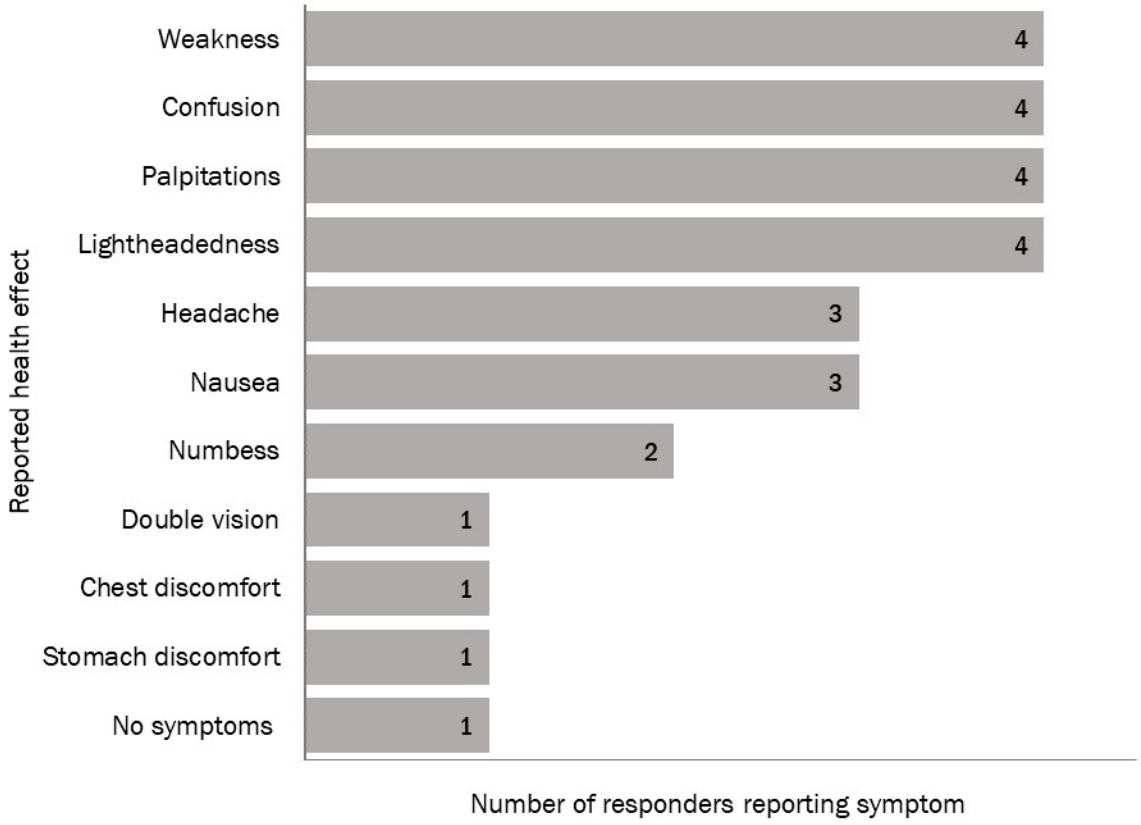
- Eight responders reported a range of symptoms. The most common symptoms were weakness, confusion, palpitations, nausea, and lightheadedness (Table C1 and Figure 1).
- Three deputy sheriffs and six fire fighter-EMS providers were evaluated in the ED after going through decontamination procedures. One responder reported no symptoms.
- Responders were monitored in the ED for several hours. Symptoms improved over that time.
- None of the responders received naloxone.
- Responders did not have objective signs of serious (life-threatening) opioid toxicity.
- The etiology of health effects could not be definitively identified. Nonetheless, health effects experienced by responders significantly interfered with their ability to carry out important work tasks.

Potential routes of exposure to illicit drugs likely varied among responders

- Table C1 summarizes the responders' activities during the incident.
- The responders all wore long-sleeved uniforms during the response. They wore gloves during parts of the response. None wore respirators.
- A "white powdery substance" and "a plunger to a needle" were found in a nightstand drawer in the bedroom where Victim 1 was resuscitated. There were no reports that this substance was disturbed. It was unclear whether any materials from the scene were sent for forensic analysis in a laboratory.
- No other powders were seen. None of the responders or ED staff we interviewed reported seeing any powders suspected to be illicit drugs on Victim 1.

- Potential routes of exposure could not be definitively identified. Mucous membrane (eyes or mouth) exposure through inadvertent hand or glove contact is one possible route of exposure.

Figure 1. Nine responders reported a **range of non-specific symptoms** in the ED medical records and interviews



Note: Confusion includes 'feeling off' and 'altered feeling.'

To learn more about our findings, go to Section B in the Supporting Technical Information

Our Recommendations

Benefits of Improving Workplace Health and Safety:

- ↑ Improved worker health and well-being
- ↑ Better workplace morale
- ↑ Better employee recruiting and retention
- ↑ Improved image and reputation
- ↑ Better products, processes, and services
- ↑ Increased medical and legal savings

The recommendations below are based on the findings of our evaluation. For each recommendation, we list a series of actions you can take to address the issue at your workplace. We encourage the Sheriff's Office and Fire and Rescue Department to use employee-employer health and safety committees or working groups to discuss our recommendations and develop action plans. Those involved in the work can best set priorities and assess the feasibility of our recommendations for the specific situation for each agency.

NIOSH has issued interim guidance on how to protect emergency responders from exposures to fentanyl and its analogues. We believe the current NIOSH guidance is applicable to this evaluation, even though whether fentanyl or fentanyl analogues were involved in this response cannot be confirmed with the available evidence. Because fentanyl is increasingly being found mixed with illicit drugs, responders should assume fentanyl to be present in situations involving powders suspected to be illicit drugs. Current NIOSH guidance is intended to apply to a range of emergency responders. Recommendations provided below in some cases expand upon the current NIOSH guidance.

Recommendation 1: Provide periodic training to all deputy sheriffs and fire fighter-EMS providers on how to prevent occupational exposure to illicit drugs. Training topics include standard safe operating procedures, personal protective equipment (PPE), and decontamination

Why? Illicit drugs pose a potential hazard to responders (such as law enforcement officers, fire fighters, and EMS personnel) who come into contact with these drugs in the course of their work. Training can increase responders' understanding of these topics, which can help prevent unintentional exposures. Fentanyl is commonly mixed with illicit drugs. Possible exposure routes to fentanyl and its analogues can vary based on the source and form of the drug. Responders are most likely to encounter illicit fentanyl and its analogues in powder (including compressed powder), tablet, or liquid form. Potential exposure routes of greatest concern include inhalation, mucous membrane contact, ingestion, and percutaneous exposure (e.g., needlestick). Any of these exposure routes can potentially result in toxic effects. Brief skin contact with powdered fentanyl or its analogues is not expected to lead to toxic effects if any visible contamination is promptly removed.

Responders experienced symptoms such as weakness, confusion, palpitations, nausea, and lightheadedness during this incident that prevented them from carrying out their essential job duties.

How? At your workplace, we recommend these specific actions:

Follow guidance in the NIOSH Topic Page entitled "Fentanyl: Preventing Occupational Exposure to Emergency Responders" (https://www.cdc.gov/niosh/topics/fentanyl/risk.html).

While the Topic Page specifically refers to fentanyl and fentanyl analogues, it is often difficult to know at the time of an incident whether a substance suspected to be an illicit

drug includes fentanyl or its analogues. Specific recommendations that are most relevant to this incident include:

- Do not touch the eyes, mouth, and nose after touching any surface potentially contaminated with illicit drugs.
- Avoid performing tasks or operations that may make illicit drugs airborne.
- Wash hands with soap and water (or just water) immediately after a potential exposure and after leaving a scene where illicit drugs are known or suspected to be present to avoid potential exposure and cross-contamination. Do not use hand sanitizers or bleach solutions to clean contaminated skin when fentanyl or its analogues are suspected to be present.
- Wear nitrile gloves when illicit drugs are suspected to be present. When powders potentially containing fentanyl are not visible, but suspected to be present, exposure level can be considered "minimal" according to NIOSH guidance for emergency responders. Train responders (1) on how to remove gloves safely and (2) to change gloves when they become contaminated as soon as practical during response activities; gloves should be also be changed periodically during response activities even without evident contamination.

Recommendation 2: Develop new or modify existing policies and procedures for emergency response work involving illicit drugs for situations where the anticipated level of exposure is "moderate" or greater

Why? Current NIOSH guidance is intended to apply to a range of emergency responders. At each specific workplace, those involved in the work can best determine how to apply the guidance to the specific conditions they face.

A "moderate" exposure level refers to situations where small amounts of products that might contain fentanyl are visible.

How? At your workplace, we recommend these specific actions:

Take into account existing guidance for first responders

In addition to NIOSH recommendations, this includes:

- Recommendations from the state's Department of Health: http://www.vdh.virginia.gov/content/uploads/sites/23/2018/01/Fentanyl-FAQ-opioid-exposure-among-va-first-responder-survey.pdf
- The Interagency Board for Equipment Standardization and Interoperability's recommendations for first responder PPE and decontamination:

https://www.interagencyboard.org/content/first-responder-ppe-and-decontamination-recommendations-fentanyl-august-2017

Consider working with occupational safety and health experts and/or persons with expertise on PPE and emergency response work on a job safety analysis

Specific topics to address include:

- How to conduct an on-scene risk assessment.
- Communicating about the discovery of suspected illicit drugs with all responders on the scene and managing access to that area of the scene.
- Timing for putting on PPE in unsecured or unsafe conditions when illicit drugs might be present.
- Maintenance of clear and effective communication, particularly over radios or similar devices, while wearing PPE.
- Procedures for changing gloves and disposing of used gloves after performing tasks with potential for contamination with illicit drugs. Tasks include providing emergency medical care to potential overdose victims, handling illicit drugs, and searching or handcuffing subjects who might have recently handled them.

Train responders on these new policies and procedures

Recommendation 3: Continue to coordinate with local hospitals about communicating information about the response and decontamination needs

Why? Providing information to hospital EDs that receive patients from EMS responses can help the hospital better coordinate patient care and, if needed, decontamination of patients and responders. Ensuring that fire fighter-EMS providers can access soap and water at hospitals after EMS responses with suspected fentanyl products or illicit drugs can help EMS responders perform personal decontamination and decontaminate surfaces and equipment before disinfectants are used.

Recommendation 4: Working with 911 dispatch coordinators, identify possible improvements in information gathering and communication before emergency responders arrive at scenes where there might be illicit drugs

Why? Having information about whether powders that might be illicit drugs are on-scene before first responders arrive is useful. It can help them anticipate the potential level of exposure and prepare accordingly before conducting their own on-scene risk assessment.

Recommendation 5: Develop standard ways to share information about forensic laboratory results, if performed for law enforcement purposes, among agencies that jointly participate in responses involving illicit drugs

Why? If substances are identified as being present at the scene of response activities, that documentation should be placed in the occupational health or personnel records of applicable law enforcement staff and fire fighter-EMS providers.

The various agencies (Sheriff's Office, Fire and Rescue Department, other partners such as the regional HAZMAT team) can periodically review this information to help determine whether changes in current procedures are needed. The agencies can use this information, together with employee reports of possible exposures and health effects, to find any trends affecting the risk of unintentional work-related exposure to illicit drugs.

Recommendation 6: Encourage responders to report possible exposures to and health effects resulting from exposure to illicit drugs to their supervisors

Why? The Sheriff's Office and Fire and Rescue Department can periodically review this information to help determine whether changes in current procedures are needed. They can use this information along with forensic testing results to find any trends affecting the risk of unintentional work-related exposure to illicit drugs and any associated health effects.

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Supporting Technical Information

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HHE Report No. 2018-0083-3332

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Section A: Workplace Information

At the time of the evaluation, the Sheriff's Office included a Field Operations Division with 114 assigned deputies. Deputies were assigned to one of three overlapping 11.5-hour shifts (day, evening, or midnight).

The Fire and Rescue Department had 131 full-time career fire fighter-EMS providers operating from 13 stations. The department also included approximately 200 active volunteer fire fighter-EMS providers operating via 14 volunteer fire and rescue or EMS squads. Daily staffing for the department included six paramedic transport units (ambulances) and four fire suppression units (engines), along with various other support equipment. Fire fighter-EMS providers worked in 24-hour shifts on days 1, 3, and 5 of a 9 day-day cycle and were off on days 2, 4, and 6–9 of the cycle.

In the recent past, both the Fire and Rescue Department and Sheriff's Office had received an increased volume of calls related to drug overdoses. This trend is consistent with the increased number of overdose fatalities related to fentanyl, fentanyl analogues, and illicit drugs nationally [Centers for Disease Control and Prevention (CDC) 2018a]. The Fire and Rescue Department responded to over 170 calls related to opioid use in 2017. Among those responses, over 120 different victims received naloxone as part of the response.

Section B: Methods, Results, and Discussion

Our objectives were to:

- Review activities of the responders (fire fighter-EMS providers and deputy sheriffs) during the March 1–2, 2018 response to characterize potential exposure to illicit drugs.
- Determine whether the LEOs who developed symptoms during the March 1–2, 2018 response might have been exposed to illicit drugs and consider potential routes of exposure.
- Make recommendations on how to prevent exposures to illicit drugs among responders.

Methods: Description of the March 2018 Incident

We visited the Sheriff's Office and Fire and Rescue Department on March 13–14, 2018. During the visit, we conducted voluntary, confidential medical interviews with all nine responders who underwent medical evaluation immediately after the March 1–2, 2018 incident. During the interviews, we discussed the incident. We also discussed work history and practices, training, PPE use, and any health effects experienced around the time of the incident. In addition, we reviewed the narratives from the Sheriff's Office and the Fire and Rescue Department for the response and had brief discussions about the response with members of the Fire and Rescue Department command staff. It was unclear whether any materials from the scene were sent for forensic analysis in a laboratory.

Results: Description of the March 2018 Incident

Summary of Events during the March 2018 Response

On the evening of March 1, 2018, three deputy sheriffs and six fire fighter-EMS providers were dispatched for a reported drug overdose at a private residence. The initial responder on the scene was a deputy sheriff (Deputy Sheriff 1), who was directed to a bathroom where a male (Victim 1) was unresponsive in the shower area. Victim 1 was wet as the result of attempted revival by other civilians on the scene. With the assistance of a civilian, Deputy Sheriff 1 moved Victim 1 to the floor of a nearby bedroom. Victim 1 was described as having a pulse and "inconsistent" breathing; respirations reportedly only occurred every 15–20 seconds. Victim 1 was also described as cyanotic. Deputy Sheriff 1 administered intranasal naloxone and performed sternal rubs on Victim 1 with no response.

Fire fighter-EMS providers arrived soon after and took charge of resuscitation efforts. Life support measures performed on Victim 1 included ventilation via a nasal airway and bag-valve mask and obtaining intravenous access. In total, Victim 1 received 10 milligrams of intranasal and intravenous naloxone. Victim 1 was transported using a portable flexible stretcher to the ambulance and then to the ED. Victim 1 became responsive and began breathing on his own during transport to the ED. A fire engine at the scene of the response and a deputy sheriff also proceeded to the ED with the ambulance. As the ambulance was on its way to the ED, a report was provided to the ED that a fire fighter-EMS provider (FF-EMS 1) was symptomatic; the health effects are described below.

Upon arrival at the hospital, responders were met outside the ED in the hospital's decontamination area. All nine responders and Victim 1 underwent the decontamination procedures set up by the

hospital, which included removal of clothes, showering, and re-clothing with a disposable hospital gown.

The scene of the response was described as a private residence. No powders suspected to be opioid drugs were observed on Victim 1 during the resuscitation efforts. An unspecified amount of a "white powdery substance" and a "plunger to a needle" were found in a nightstand drawer in the bedroom where Victim 1 was resuscitated. There were no reports that this substance was disturbed during the response. There were no other powders reported at the scene of the response. Several responders and hospital staff reported that civilians present on the scene provided various information about possible substances being used at the residence. This included (a) the activity was a "pill party;" (b) participants were "doing roxy;" and (c) participants were "snorting OxyContin." There was no confirmation of information concerning forms or formulations of any of the substances potentially used at the scene. Some responders reported a slight haze in the residence; some responders thought it was related to tobacco or marijuana smoke. It was not clear from the interviews and records reviewed whether any materials from the scene were sent for forensic analysis in a laboratory.

There were approximately six or seven other civilians at the scene. All were thought by responders to have been under the influence of unknown substances, in part due to their semi-responsive states. Two other civilians (Victims 2 and 3), who at various times during the incident might have been indoors or outdoors, were subsequently transported to the ED for care; they also underwent decontamination procedures upon arrival. A deputy sheriff administered naloxone to Victim 2 on the scene due to signs of opioid toxicity, which reportedly included lethargy ("nodding off"); it was reported that Victim 2's status improved after naloxone administration.

Summary of Responders' Job Tasks and Symptoms during the Response

Of the nine responders who were evaluated at the ED, six were the initial fire fighter-EMS providers on the scene, and three were the initial deputy sheriffs on the scene. There were other fire fighter-EMS and law enforcement personnel on the scene at the residence during the response, but they were not evaluated at the ED and were not part of this evaluation. All nine responders reported that their routine duties included periodic responses to overdose scenes in the community. Although responses to overdose incidents were reported to sometimes occur in clusters, they reported responding to approximately two to three overdose incidents per month.

FF-EMS 1, 2, and 3 were three of the four responders who provided the most direct care to Victim 1 (e.g., managing the airway, establishing intravenous access). Several responders helped lift Victim 1 from the floor using a flexible stretcher and move Victim 1 into the ambulance. Deputy Sheriff 1 had assisted in moving Victim 1 out of the shower with ungloved hands. After donning gloves, Deputy Sheriff 1 administered the first dose of naloxone to Victim 1. All other interviewed responders also reported wearing gloves throughout the response. Deputy Sheriff 1 subsequently performed other routine duties as part of the response. The other deputy sheriffs had no direct contact with Victim 1; their activities on the scene included other duties typical for this type of response, including assessment of scene security.

During the response, all interviewed responders reported wearing their usual uniform, which consisted of a long-sleeve garment. The responders reported changing gloves at varying intervals during the response. None wore respirators. All nine responders who underwent medical evaluation reported being at their baseline level of health prior to the response. In our interviews, two responders staffing the ambulance (FF-EMS 1 and 2) and one from the fire engine (FF-EMS 3) reported symptoms during the response. Of the three other fire fighter-EMS providers from the engine (FF-EMS 4, 5, and 6), two reported mild symptoms during the evaluation at the ED, and one reported no symptoms. Table C1 summarizes the response activities and reported symptoms. Approximate duration of the symptoms is reported in Table C1; in general, most of the symptoms resolved after several hours, with one responder's symptoms lasting less than an hour.

Methods: Medical Record Review

We reviewed the medical records from the ED for the nine evaluated responders. We also spoke with ED staff who coordinated decontamination procedures at the hospital and attended to the overdose victims and responders. Specifically, we spoke with one of two treating physicians and six members of the nursing staff (nurses, paramedics, and emergency medical technicians).

Results: Medical Record Review

Figure 1 summarizes the symptoms experienced by the nine responders as documented in the medical records and from our interviews. The symptoms in the medical records were consistent with what hospital staff and responders reported to us during interviews. Several responders were noted by ED staff to be objectively flushed and uncomfortable upon presentation. Eight of the nine responders evaluated in the ED had one or more symptoms documented in the ED medical records.

The primary healthcare performed in the ED for the responders included monitoring of vital signs and observation. All responders had normal temperature and heart rate, normal to elevated blood pressure, and normal to elevated respiratory rate during the course of observation in the ED. Pupils were noted to be dilated in one responder, and the eye examination was documented as "normal [to] inspection" in two responders. However, actual pupil size was not documented for any of the responders. Hospital staff indicated that the responders were all "clinically stable" during the observation periods and the mild elevations in blood pressure and respiratory rate mentioned above were not thought to be unusual. One responder had a urine drug screen performed; the screen was negative for opiates, cocaine, phencyclidine, cannabinoids, amphetamines, benzodiazepines, and barbiturates. All responders' symptoms improved over the time of evaluation in the ED. One responder received acetaminophen and an anti-nausea medication; the other responders were observed. The clinical impressions of the ED physicians for the responders included two with "chemical exposure" and seven with "accidental overdose (opiate, possible occupational exposure)" or impressions with very similar wording.

ED staff coordinated the decontamination process for all nine responders and the three victims who presented to the hospital. No drugs or visible contaminants were noted by hospital staff on the responders or victims presenting to the ED. Decontamination was performed in the hospital's decontamination rooms, which were readily accessible from the ambulance entry area and adjacent to the ED.

Methods: Other Discussions

We discussed emergency dispatcher procedures for potential overdoses with a member of the county emergency communications center and a member of the Fire and Rescue Department command staff.

Results: Other Discussions

We learned about the standard information that emergency dispatchers collect from callers and convey to responders during an incident. Emergency dispatchers use various cue cards to prompt callers for more information. The cue card for overdose/poisoning includes prompts to ask whether the overdose victim is alert, breathing normally, changing color, and violent. The cue card also prompts dispatchers to ask callers what the overdose victim might have taken. In addition to giving a verbal account of the call to responders, dispatchers enter information from the call into an electronic record that fire fighter-EMS providers can access from their vehicles.

Discussion

From 2015 to 2016, there was a 100% increase in the rate of overdose deaths involving synthetic opioids (includes fentanyl and its analogues) in the United States [CDC 2018a]. Fentanyl and its analogues are increasingly being mixed with other drugs, particularly cocaine [CDC 2018b]. This has raised concerns about the potential for exposure to illicit drugs among emergency responders (e.g., law enforcement officers and fire fighter-EMS personnel), who might unintentionally come into contact with these substances in the course of their work [Howard and Hornsby-Myers 2018].

Issues Related to Health Effects

The current drug abuse epidemic frequently involves situations in which: (1) multiple drugs are abused, and (2) the identity of the substances being abused cannot be determined without laboratory analysis [Liu et al. 2018]. In this response, eight responders reported a range of non-specific symptoms during the response and subsequent evaluation in the ED. It was unclear whether any materials from the scene were sent for forensic analysis in a laboratory.

Classic signs and symptoms of severe opioid toxicity include lethargy or other indications of CNS depression, shallow or slow breathing, miosis (small or pinpoint pupils), slow heart rate, and low body temperature [Boyer 2012; Ropper et al. 2014]. However, not all patients experiencing opioid intoxication consistently experience all of these components [Boyer 2012]. Low-dose exposure to opioids might result in milder symptomatology. A continuum of signs and symptoms experienced upon exposure to opioids has been described, which includes lightheadedness and nausea reported by several responders [Lynch et al. 2018; Suzuki and El-Haddad 2017].

Various types of stimulant drugs might also lead to non-specific symptoms. Classically, toxicity from stimulants involves elevated heart rate and blood pressure, increased alertness, sweating, nausea and vomiting, and hallucinations [Baumann et al. 2014; Krotulski et al. 2018]. Cocaine also has local anesthetic effects such as numbness and tingling [Aronson 2016].

Non-specific health effects that may be associated with exposure to combinations of agents, particularly at levels of exposure not causing serious (life-threatening) toxicity, may be difficult to differentiate from each other. Additionally, illicit drugs might contain adulterants or contaminants that could, by themselves or in combination, lead to symptoms [Behrman 2008; Cole et al. 2011].

Eight of nine responders who underwent medical evaluation reported a range of symptoms. It is critical to recognize that the symptoms experienced by the responders in this evaluation did not allow them to perform their essential job junctions. None of the responders had symptoms or findings on clinical evaluations that were consistent with severe opioid toxicity. However, the non-specific symptoms they experienced could be consistent with milder toxicity related to drug exposure. The clinical impressions from the ED physicians included "chemical exposure" and "accidental overdose (opiate, possible occupational exposure)." In our evaluation, it is not possible to determine if other clinical factors or perceived risk might have impacted the observed health effects. The concept of "perceived risk," or the subjective judgement that individuals make about the type and severity of any risk, has been associated with increased anxiety and symptom reporting separate from physical exposure to a hazard [Gallacher et al. 2007]. The possible relationships between perceived risk, the types of exposures, and the clinical status of the responders discussed in this report were not assessed in this HHE.

Issues Related to Potential Exposure

In general, inhalation, mucous membrane contact, ingestion, and percutaneous exposure (e.g., needlestick) are potential work-related routes of exposure to opioid drugs among responders. Brief skin contact by itself with small amounts of powdered fentanyl or its analogues is not expected to cause symptoms [Interagency Board 2017; Lynch et al. 2018; Moss et al. 2017; NIOSH 2017], but possible subsequent hand-to-face contact could be a possible route of exposure.

The information reviewed suggested Victim 1 experienced life-threatening opioid toxicity (overdose) in the residence. Responders reported that they determined that the clinical condition of Victim 1 was consistent with opioid overdose, and Victim 1 had an apparent positive clinical response to naloxone administration. Naloxone was reportedly administered to one other civilian during the incident, also with a positive clinical response. The emergency responders and hospital staff we interviewed reported no powder suspected to be opioids on the victims. The Sheriff's Office narrative noted the presence of a white powdery substance in the bedroom where Victim 1 was resuscitated. Overall, the potential routes of officers' exposure to the responders remain unclear, and likely varied among the responders who performed various law enforcement and EMS tasks. The responders experiencing health effects during this incident reported being in various parts of the response scene. We cannot rule out several possible exposure scenarios or the possibility that more than one work-related factor may be associated with the observed symptoms among the symptomatic responders. For example, a small amount of illicit drugs might have been present at the residence and been transferred to the responders' mucosal membranes (nose or mouth) or eyes through inadvertent hand or glove contact. A slight haze in the residence was noted by several responders; we have no information on the source of the reported haze.

The negative urine drug screen for one responder does not rule out the possibility of exposure. The ability to detect synthetic opioids in blood (or serum) and urine is an area of active investigation, with known limitations [Armenian et al. 2017; Suzuki and El-Haddad 2017]. For example, current opiate screens will not detect synthetic opioids such as fentanyl [Suzuki and El-Haddad 2017]. Other uncertainties include the timing of testing relative to potential exposure and the sensitivity of various tests. In addition, established cutoff levels for urine drug screening tests take into consideration the desirability of avoiding false-positive tests [Moeller et al. 2017]; therefore, results lower than established cutoff levels are reported as negative.

Limitations

This evaluation is subject to several limitations. The investigation was retrospective in nature; interviews with the responders occured approximately 2 weeks after the incident. Limitations related to fully characterizing the exposures are discussed above. Although we reviewed the ED records for the responders with health effects related to this incident, we cannot completely rule out the possibility that unrecognized medical conditions might have contributed to the health effects observed.

Conclusion

During a response in March 2018, deputy sheriffs and fire fighter-EMS providers developed health effects shortly after treating or transporting a victim with suspected opioid overdose. The etiology of symptoms and source(s) of exposure for the responders could not be definitively identified. None of the responders' health effects involved classic, life-threatening opioid toxicity, but the health effects impacted their ability to perform essential job duties. Opioids and other drugs can cause milder, non-specific symptoms similar to some of the symptoms reported by responders in this response. Further evaluations and research are needed to improve understanding of the routes of exposure and health effects among first responders potentially exposed to drugs including fentanyl and its analogues in the course of their work.

Section C: Tables

Table C1. Activities and symptoms reported by responders during interviews and medical records (n = 9)

Responder	Activities	Symptoms reported during interview or in medical records	Symptom onset location	Time to onset* (minutes)	Approximate duration of symptoms (hours)
FF-EMS 1	Provided patient care to Victim 1	Palpitations, numb feeling in lips and fingertips, confusion, weakness, headache, nausea	Outside the residence, as Victim 1 was being loaded on ambulance	10–15	2–3
FF-EMS 2	Provided patient care to Victim 1	Lightheadedness, confusion	Hospital, upon arrival	20	Several
FF-EMS 3	Provided patient care to Victim 1	Palpitations, weakness, nausea, stomach discomfort	Hospital, decontamination area	20	3
FF-EMS 4	No direct contact with Victim 1; various response activities inside and outside the residence	Mild weakness	Uncertain; symptoms resolved prior to arrival at hospital	10–15	10–15 minutes
FF-EMS 5	Brief direct contact with Victim 1 – helped initiate care; various response activities inside and outside the residence	No symptoms	N/A	N/A	N/A
FF-EMS 6	Assisted with care of Victim 1 in residence and ambulance	Lightheadedness, “just feel off”	Prior to arrival at hospital	20–30	1.5
Deputy Sheriff 1	Moved Victim 1 to bedroom without gloves, administered naloxone and sternal rubs to Victim 1	Lightheadedness, nausea, weakness	Inside the residence	5	1.5
Deputy Sheriff 2	Law enforcement activities inside and outside the residence; no direct contact with Victim 1	Headache, double vision, “altered feeling,” palpitations	En route to hospital	20–30	4–5
Deputy Sheriff 3	Law enforcement activities inside and outside the residence; no direct contact with Victim 1; direct contact with other civilians on scene	Lightheadedness, palpitations, mild chest discomfort, lower leg numbness, headache	Outside the residence	10–15	Several

N/A, not applicable

*Approximate time from arrival on scene to symptom onset (minutes)

Section D: References

Opioids

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