HHE Health Hazard® Evaluation Program

Evaluation of Law Enforcement Officers' Potential Occupational Exposure to Illicit Drugs — Virginia

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Availability of Report

Copies of this report have been sent to the employer and employees at the police department. The state and local health department and the Occupational Safety and Health Administration Regional Office have also received a copy. This report is not copyrighted and may be freely reproduced.

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Table of Contents

Main Report

Supporting Technical Information

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Introduction

Request

In April 2018, a police department requested a health hazard evaluation (HHE) concerning unintentional potential exposure to illicit drugs among police officers during a response to a 911 call. The call was about a person who reportedly had a drug overdose in a hotel room. Four police officers 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 (LEOs) 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 May 14–15, and June 21, 2018, we visited the police department.

- During the May site visit, we met with officers directly involved with the incident and representatives of the police department command staff.
- During the June site visit, we reviewed the department's work practices and procedures.

We also reviewed relevant records:

- the police department incident/investigation report;
- forensic laboratory testing results for substances found at the scene of the response and submitted for testing;
- records from the hazardous materials (HAZMAT) response during the incident;
- medical records related to the incident for the four officers; and
- video footage of the response from police officers' body cameras.

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

Our Key Findings

Officers responded to a 911 call about an overdose where illicit drugs were present

- On April 26, 2018, three police officers were dispatched for a 911 call. The call was about an unconscious person (Subject 1) with possible drug overdose in a hotel room. A fourth officer at police headquarters handled materials from the hotel room.
- Upon arrival, police officers encountered two persons (Subjects 1 and 2) in the hotel room.
- When the officers entered the hotel room, they saw drug paraphernalia and powders that appeared to be illicit drugs.
- Subject 1, the purported overdose victim mentioned in the 911 call, was found conscious and did not require emergent medical care, but was noted to be obviously 'under the influence of some drug.'
- Subject 1 was in the hotel room's bathroom. Officers noted hearing the toilet flush multiple times.

Potential routes of exposure to illicit drugs likely varied among officers

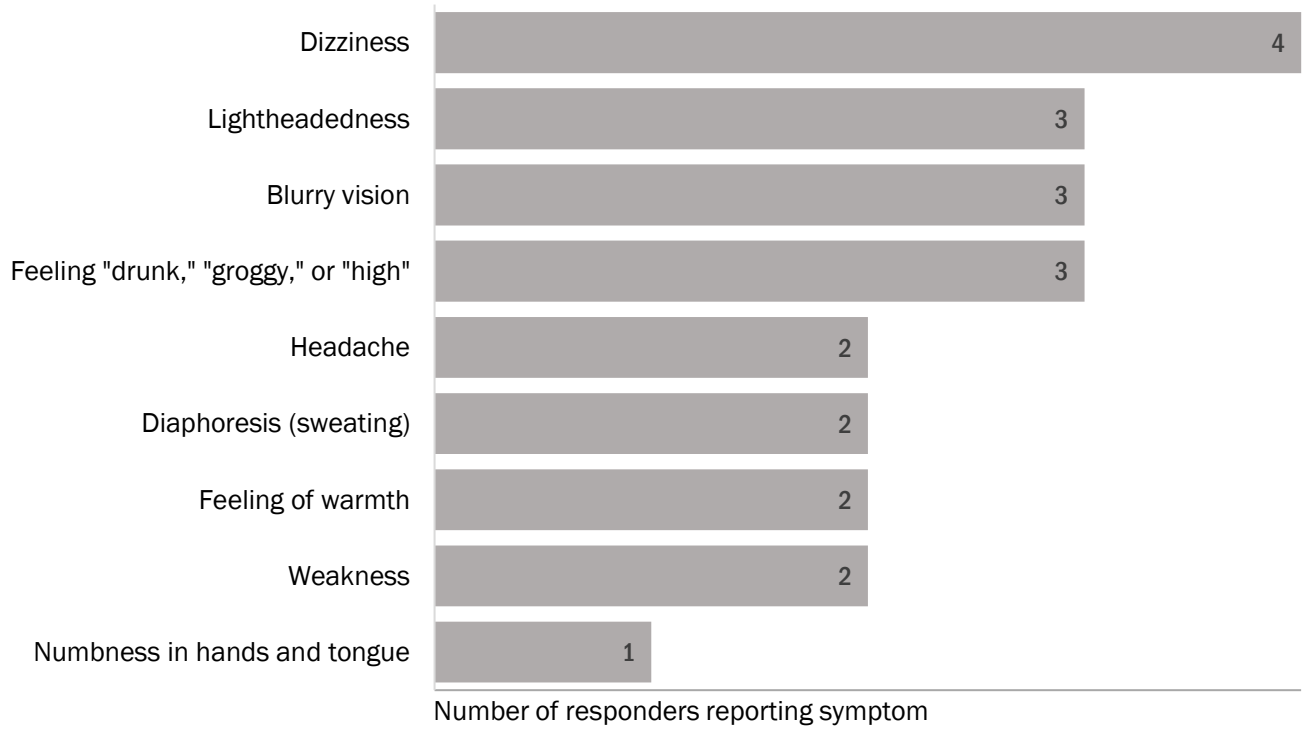
- Table C1 summarizes the officers' activities during the incident.
- The officers were wearing short-sleeved uniforms. They wore gloves and half-facepiece respirators with P100 filters during parts of the response.
- After the incident, laboratory testing of evidence samples confirmed that opioids, cocaine, methamphetamine, and cathinones ("bath salts") were in the hotel room.
- Potential routes of exposure for each officer to the substances remain unclear. They could have included inhalation and mucous membrane exposure.
- Some work activities might have resulted in officers handling items that were cross-contaminated.

Officers experienced work-related health effects

Four officers experienced adverse health effects (Table C1 and Figure 1). This included the three officers who responded to the hotel room and an officer at police headquarters who handled materials from the hotel room.

- Naloxone was administered to one officer at the scene of the incident.
- Health effects experienced by officers at the scene significantly interfered with their ability to carry out important work tasks.
- Officers did not have objective signs of respiratory depression or miosis (small or pinpoint pupils), which are signs consistent with serious (life-threatening) opioid toxicity.
- The emergency department physician's assessments included "acute dizziness" and "possible fentanyl exposure."
- Officers were monitored in the emergency department for several hours. Symptoms improved over that time.

Figure 1. Symptoms reported by police officers in medical records and interviews



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

Our Recommendations

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 multiple illicit drugs were involved in this incident. 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. In some cases, the recommendation below are unique to the work duties and responsibilities of law enforcement responders. For example, use of personal protective equipment (PPE) such as respirators can be particularly challenging for police officers already tasked with carrying and using many other types of equipment. In addition, assessing potential hazards in unsafe or unsecured environments can also be a challenge for police officers.

Recommendation 1: Continue periodic training to employees on how to prevent occupational exposure to illicit drugs. Training topics include standard safe operating procedures, PPE, and decontamination.

Why? Illicit drugs pose a potential hazard to responders (such as LEOs, fire fighters, and emergency medical services (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. 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, and/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 fentanyl or its analogues is not expected to lead to toxic effects if any visible contamination is promptly removed.

Officers experienced symptoms of dizziness, lightheadedness, "blurry vision," and disorientation during the incident.

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).

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 fentanyl.
- Avoid performing tasks or operations that may make fentanyl airborne.
- Wash hands with soap and water (or just water) immediately after a potential exposure and after leaving a scene where fentanyl is known or suspected to be present. Do not use hand sanitizers or bleach solutions to clean contaminated skin.
- Clean equipment (decontaminate) by wiping down with soap and water (or just water), following manufacturer's recommendations as appropriate. Do not use bleach solutions to clean contaminated equipment.
- Wear nitrile gloves when illicit drugs are suspected to be present. When fentanyl is not visible, but suspected to be present, exposure level can be considered "minimal" according to NIOSH guidance for emergency responders. Train officers (1) on how to remove gloves safely and (2) to change or remove gloves after completing work tasks that involve potential contamination with illicit drugs and before working in an area where illicit drugs are not suspected to be present.

- For example, when processing evidence, an officer should remove gloves after handling illicit drugs before using a computer in a common space.
- Equipment that may have surfaces contaminated with illicit drugs should be handled with gloves until decontaminated.

Recommendation 2: Develop departmental policies and procedures that are more specific for police work involving opioids (and other illicit drugs)

Why? Current NIOSH guidance is intended to apply to a range of emergency responders. Police work might include unique conditions, such as the need to wear a lot of equipment and finding illicit drugs in unsecured or unsafe environments.

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

Take into account existing guidance for first responders

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

Specific topics to address include:

- Coordination of proper respirator use. Consider:
  - conducting training on proper respirator use along with the equipment carried by police officers, such as duty belts, body cameras, and radios
  - 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 handling illicit drugs and handcuffing subjects who might have recently handled them.
- Provision of equipment, which can be easily disposed of or cleaned, intended for responding to illicit drug incidents. The police department is already using similar procedures at crime scenes where there is blood or other bodily fluids.

Train officers on these new departmental policies and procedures

Recommendation 3: Working with 911 dispatch coordinators, identify possible improvements in information gathering and communication before police officers 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 4: Encourage officers to report possible exposures to and health effects resulting from exposure to illicit drugs to their supervisors

Why? The police department can periodically review this information to help determine whether changes in current procedures are needed. The police department can use this information together with forensic testing results to find any trends affecting the risk of unintentional work-related exposure to illicit drugs and any associated health effects.

Supporting Technical Information

Evaluation of Law Enforcement Officers' Occupational Exposure to Illicit Drugs — Virginia

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Section A: Workplace Information

The police department has more than 100 full-time and part-time employees. In 2017, officers responded to more than 28,000 calls for service. In the recent past, the police department has reportedly 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 other illicit drugs nationally [Centers for Disease Control and Prevention 2018a].

Section B: Methods, Results, and Discussion

Our objectives were to:

- Review the activities of the four officers (Officers 1–4) who developed symptoms during the April 26, 2018 incident and all available records to assess whether the officers might have been exposed to opioids or other illicit drugs.
- Review information concerning any health effects experienced by the officers who underwent medical evaluation, including information from available medical records.
- Make recommendations on how to prevent exposures to illicit drugs among police officers.

Methods: Description of the April 2018 Incident

We visited the police department on May 14–15, 2018. During the visit, we conducted voluntary, confidential interviews with all four police officers who underwent medical evaluation immediately after the April 26, 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 spoke with the detective who collected evidence samples submitted for forensic analysis. We also discussed the incident and departmental policies and procedures with representatives of the police department command staff. We returned on June 21, 2018 to review department work practices and procedures.

To describe the incident, we also reviewed:

- the police department incident/investigation report;
- records from the HAZMAT response during the incident; and
- video footage of the response from police officers' body cameras.

Results: Description of the April 2018 Incident

On April 26, 2018, three police officers were dispatched for a 911 call reporting an unconscious person with possible drug overdose in a hotel room. A summary of the officers' activities at the scene is presented in Table C1. An EMS unit arrived and remained on standby as Officers 1–3 made entry into the hotel room. Two persons (Subjects 1 and 2) were present in the hotel room. Subject 1 was in the hotel room's bathroom when the officers made entry into the hotel room; officers noted hearing the toilet flush multiple times. Subject 1, the purported overdose victim mentioned in the 911 call, was conscious, refused medical care, and did not require emergent medical care. However, the officers determined that Subject 1 was "obviously under the influence of some substance (drug)." Subject 2, who made the 911 call, remained in the room and was involved with subsequent police activity as noted below.

When the officers entered the hotel room, they saw syringes (some containing liquid), electronic scales, and white and tan powders loose in various parts of the room and also within various types of bags used to hold illicit drugs, all in plain view. The officers performed law enforcement duties including

detaining the two subjects and securing the room. Officer 2 took pictures with a camera as part of the process to obtain a search warrant to further search the room. Body camera footage showed that Officer 2 touched Subject 2's arms and hands in order to handcuff them and various surfaces in the room during the photographing process. Officer 2 handled objects such as a camera and ruler while taking pictures, without decontaminating them. Officer 2 was wearing gloves during all of these activities; however, Officer 2 touched everything with the same pair of gloves, including the inside of a respirator while assembling it for personal use.

Officers 1 and 2 wore gloves upon entry into the room. Officer 3 put on gloves soon after entering the room. Glove changes were not observed on the body camera footage. After observing the apparent illicit drugs, the officers took turns leaving the room to retrieve and put on half-facepiece, elastomeric, air-purifying respirators with P100 filters. All wore short-sleeved uniforms. Officer 2 spent approximately 10 minutes in the room before departing for police headquarters to process information for a search warrant. Officers 1 and 3 stayed in the room to detain the subjects and maintain security of the room. During this time, the officers assisted the handcuffed subjects in various ways. For example, Officer 1 brought a towel from the bathroom to a subject several times.

While processing the search warrant at police headquarters, which involved working on a computer and handling the camera, Officer 2 developed lightheadedness, dizziness (a feeling of "grogginess"), and tingling in both hands. These symptoms developed approximately 25 minutes after initial entry into the hotel room. Officer 2 was assisted by Officer 4 and other officers. Officer 2 received intranasal naloxone. As advised by EMS providers, Officer 2 showered as part of decontamination procedures before being transported to the emergency department by ambulance. Upon hearing about Officer 2's symptoms, the officers at the hotel room requested a HAZMAT unit and an additional fire fighter-EMS unit to be on standby.

In the course of maintaining the security of the hotel room, Officer 1 developed symptoms approximately 75 minutes after initial entry into the room. Officer 1's symptoms began approximately 3 minutes after directly assisting Subject 2 with a potentially contaminated towel from the bathroom. Officer 1's initial symptoms included blurry vision, feeling of warmth, weakness, dizziness/lightheadedness, and feeling "drunk." Officer 1 was assisted to the hallway outside the room before slumping against the wall and subsequently to the ground; these events were captured on the video footage available for review. Intranasal naloxone was administered, and an ambulance transported Officer 1 to the emergency department.

At this point, the subjects were removed from the hotel room and underwent decontamination procedures. Officer 3 stayed in or around the room to maintain security. After the entire floor of the hotel was evacuated, the room was secured with evidence tape. Officer 3 reported that there was white powder on his pants. Fire department personnel then assisted Officer 3 through decontamination procedures. Officer 3 was transported to the emergency department by ambulance. En route, Officer 3 reported dizziness/lightheadedness, blurred vision, headache, and "feeling drunk." These symptoms developed approximately 90 minutes after initial entry into the room.

Officer 4 was not present at the scene of the response. At police headquarters, Officer 2 asked Officer 4 for assistance in retrieving the camera from the police vehicle so that pictures from the hotel room could be used to obtain a search warrant. Without gloves, Officer 4 handled the camera and other items in Officer 2's vehicle that were in the hotel room. Officer 4 participated in providing aid to Officer 2 when Officer 2 became symptomatic. Officer 4 assisted in decontaminating Officer 2's equipment and gear using sanitizing wipes ("Clorox® wipes") while wearing gloves and Officer 2's police vehicle while wearing gloves and a respirator. Officer 4 reported no visible contamination of any of the equipment or materials handled. Approximately 30–45 minutes after beginning to assist Officer 2 with the search warrant, Officer 4 developed disorientation, dizziness/lightheadedness, headache, feeling of warmth, and increased perspiration. Officer 4 underwent decontamination procedures before being transported to the emergency department by ambulance.

At least one other police officer participated in the response and was present in the hotel room for less than 3 minutes. That officer reported no symptoms and was not evaluated at the emergency department. As noted above, Officers 1–4 underwent a standard decontamination procedure prior to transport to the emergency department. Decontamination consisted of removing clothing and equipment, showering or being washed with water, and donning fresh garments. None of the officers were reported to have respiratory depression prior to arriving in the hospital.

The hotel room had a wall ventilation unit, which was noted to have been intermittently on during the course of the response. After the hotel room was secured, a detective and HAZMAT personnel re-entered the room to collect relevant materials while wearing Level B PPE. The ventilation unit was disabled prior to re-entering the hotel room.

Methods: Medical Record Review

We reviewed the medical records from the emergency department for Officers 1–4.

Results: Medical Record Review

Figure 1 summarizes the symptoms experienced by the four police officers as documented in the medical records and from our interviews. Selected health information is presented in Table C1 along with summaries of officers' activities during the incident.

The primary healthcare performed in the emergency department for the officers included monitoring of vital signs and observation. Officers had normal body temperatures, normal to elevated blood pressures, and normal to elevated heart rates. Three officers had normal to elevated respiratory rates during their EMS evaluation and throughout their emergency department visit. Officer 4 had a respiratory rate of 16 breaths per minute documented by EMS providers before arriving in the emergency department. This officer's respiratory rate ranged from 9 to 20 breaths per minute in the emergency department.

On physical examination, all of the officers were alert and oriented; none had documented miosis (small or pinpoint pupils) or respiratory distress. Electrocardiograms did not reveal any electrocardiographic abnormalities. Three of the four officers had blood tests, which ruled out several medical conditions

including volume depletion and hypoglycemia; the fourth officer did not have blood tests. Urine samples from all four officers tested negative in a screen for cannabinoids, phencyclidine, cocaine, opiates, amphetamines, benzodiazepines, and barbiturates. All four officers were discharged from the emergency department after several hours of observation and improvement of symptoms.

The medical records included the emergency department physician's clinical impression for each evaluated officers. The clinical impressions for the officers were similar; they included "acute dizziness" (or "dizziness" for one officer) and "possible fentanyl exposure" (or "possible accidental overdose" for one officer).

Methods: Forensic Analyses of Substances Found at the Response

We spoke with the detective who collected evidence samples for forensic testing. We reviewed forensic laboratory testing results for substances from the scene of the response that were submitted for testing.

Results: Forensic Analyses of Substances Found at the Response

Multiple specimens collected from the scene of the response were evaluated in a forensic laboratory. Specimens analyzed included measurable quantities of powders; items such as packaging, a spoon, and digital scales with residue; and one specimen of a liquid within a syringe. Schedule I and II controlled substances identified by the forensic laboratory are summarized in Table C2. Illicit drugs present in measurable quantities included fentanyl, heroin, and N-ethylpentylone. The liquid sample tested positive for methamphetamine and cocaine. Residues of the following substances were identified: N-ethylpentylone, dibutylone, cocaine, methamphetamine, fentanyl, and para-fluoroisobutyryl fentanyl.

Fentanyl and para-fluoroisobutyryl fentanyl are synthetic opioids. The latter is considered an analogue of fentanyl. Heroin is a semi-synthetic opioid. N-ethylpentylone and dibutylone are synthetic cathinones, which are also known as "bath salts." Synthetic cathinones, methamphetamine, and cocaine are different types of stimulants. All are classified as drugs with a high potential for abuse.

Discussion

Background

From 2015 to 2016, there has been a 100% increase in the rate of overdose deaths involving synthetic opioids (includes fentanyl and its analogues) in the United States [Centers for Disease Control and Prevention 2018a]. While the synthetic opioid fentanyl has been the focus of much attention during the current drug abuse epidemic, it is important to realize that multiple drugs of abuse may be involved in any given incident. Illicit fentanyl and its analogues are increasingly being mixed with other drugs, particularly cocaine [Centers for Disease Control and Prevention 2018b]. This has raised concerns about the potential for exposure to illicit drugs among emergency responders (e.g., LEOs and fire fighter-EMS personnel), who might unintentionally come into contact with illicit drugs in the course of their work [Howard and Hornsby-Myers 2018]. Inhalation, mucous membrane contact, ingestion, and percutaneous exposure (e.g., needlestick) are important potential routes of exposure. Brief skin contact with fentanyl or its analogues is not expected to lead to toxic effects if visible contamination is promptly removed [Interagency Board 2017; Moss et al. 2017; NIOSH 2017].

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, police officers encountered multiple drugs at the scene, including opioids and stimulants such as synthetic cathinones, methamphetamine, and cocaine.

In this incident, the quantities of the samples (trace to grams) determined by the laboratory to be present do not necessarily accurately represent the actual relative amounts of the various drugs present in the hotel room, since not all of the substances present in the room were sent to the laboratory.

Classic signs and symptoms of severe opioid toxicity include lethargy or other indications of central nervous system depression, shallow or slow breathing, miosis, 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]. Symptoms of mild opioid toxicity, as opposed to severe toxicity that includes respiratory depression, may include non-specific symptoms such as lightheadedness as some of the police officers experienced in this incident [Lynch et al. 2018; Suzuki and El-Haddad 2017].

Various types of stimulant drugs result in similar toxicity. Classically, toxicity involves elevated heart rate and blood pressure, increased alertness, sweating, nausea and vomiting, and hallucinations [Baumann et al. 2014; Krotulski et al. 2018]. With higher levels of toxicity, other organ systems (such as the kidneys) might be seriously affected by these drugs. Cocaine also has local anesthetic effects such as numbness and tingling [Aronson 2016].

Non-specific health effects that may be associated with exposure to the combinations of agents, particularly at levels of exposure not causing serious (life-threatening) toxicity, may be difficult to differentiate from each other. Toxicity might be difficult to predict based on the chemical formulation, especially for novel psychoactive drugs such as synthetic cathinones [Baumann et al. 2014]. Additionally, illicit drugs might contain adulterants or contaminants that might, by themselves or in combination, lead to symptoms [Behrman 2008; Cole et al. 2011].

Four police officers reported a range of symptoms during various time points of the April 26, 2018 incident. It is critical to recognize that the symptoms experienced by the officers in this evaluation did not allow them to continue conducting their usual law enforcement duties. The health effects experienced by the officers were not consistent with severe (life-threatening) opioid toxicity. The non-specific symptoms experienced by officers associated with this incident could be consistent with a milder form of toxicity related to drug exposure; however, in our evaluation it is not possible to determine if other clinical factors might have impacted the observed health effects. Terms such as "mild opioid toxicity" are useful to help differentiate a set of symptoms that are substantially different from the life-threatening opioid toxicity involving respiratory depression and marked central nervous depression.

Issues Related to Potential Exposure

The four officers experiencing health effects during this incident performed a number of different job duties. Officers 1–3 entered the hotel room. Some of their work practices may have increased their risk of exposure. All three were wearing short-sleeved uniforms and gloves prior to handling materials or touching the subjects. Respirators were not used on entry into the room; they were donned approximately 10–15 minutes after room entry. The presence of visible powder on hard surfaces in various parts of the room raises the possibility that loose powder may have been present but not visible on other surfaces such as bedding and linens. Activities officers performed in the room included handcuffing and detaining the subjects until the room was sealed. Officer 3 noted that there was white powder on his pants after he left the hotel room. In the course of maintaining room security and attending to the subjects until the room was sealed, moderate disturbance of bedding and linens occurred several times. For example, Officer 1 assisted a subject with a towel several times. Body camera video showed some officers were not wearing their respirators correctly. The ventilation unit was noted to have automatically turned on and off during the time the officers were in the room. We cannot determine whether any of these individual activities, or a combination of activities, may have aerosolized any loose powder that may have contaminated materials and surfaces in the room.

Additionally, it is not possible to know whether any activities of the subjects prior to the officers' entry may have led to some aerosolization of the substances in the room. In some situations, subjects using illicit substances might hide or dispose of those substances prior to interacting with police, for example, by dumping them into the toilet and flushing repeatedly. This process might contaminate bathroom floors and surfaces [Johnson et al. 2013]. Consumption of illicit drugs in bathrooms is also reportedly a common practice. Items in bathrooms such as towels may become significantly contaminated if the drugs are in powder form. The body camera footage indicated that Subject 1 flushed the toilet multiple times before opening the bathroom door as directed by the officers. Given these considerations, in some instances it might be prudent for first responders to consider bathrooms as places more likely to be contaminated with illicit drugs during opioid response activities.

Officers 2 and 4 developed symptoms while performing work duties at police headquarters. Officer 2 had been in the hotel room; Officer 4 had not. Both handled items that had been in the hotel room. Officer 4 also assisted in decontaminating Officer 2's equipment, gear, and police vehicle while wearing PPE. Their experience highlights the importance of decontamination for persons and items that have been in a potentially contaminated area.

Overall, the potential routes of officers' exposure to the substances remain unclear, and likely varied among the officers. Inhalation is a possibility among officers who performed job duties in the hotel room, as discussed above. There is also the possibility of cross-contamination of the officers' gloves and/or equipment with small amounts of illicit drugs and subsequent hand-to-face contact, potentially leading to mucous membrane exposure.

The officers' negative urine drug screens do 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]. Similarly, synthetic cathinones are not readily detected by most screening assays for amphetamines [Ellefsen et al. 2014]. Other uncertainties include the timing of testing relative to potential exposure and the sensitivity of various tests. Additionally, although the urine drug screen included tests for amphetamines and cocaine, 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.

This incident raises the broader issue of the need for specific training of LEOs to don and wear respirators and gloves correctly in conjunction with their other equipment such as their duty belt, radio, and body camera. The respirator must be correctly donned and worn with gloves and other gear such as body cameras and eyeglasses. Putting on and removing gloves and respirators in the correct sequence is important to avoid potential exposure. An additional consideration is that the first recognition of illicit drugs by a LEO might occur in an unsecured or unsafe environment, preventing the officer from donning a respirator immediately.

Section C: Tables

Table C1. Summary of officers' activities during the incident and selected health information

Officer	Activities	Symptoms reported in interviews and/or medical record	Symptom onset location and timing	Clinical impression of emergency department physician
1	Initial entry into room, detained and assisted subjects while maintaining scene security, assisted subject with towel from the bathroom	Dizziness, increased sweating, blurry vision, weakness, feeling of warmth, feeling "drunk"	At the scene of the response, approximately 75 minutes after initial response and approximately 3 minutes after assisting subject	Acute dizziness, possible accidental overdose
2	Initial entry into room, detained subjects, took photos, returned to police department to process warrant	Lightheadedness, dizziness, feeling "groggy," numbness in both hands and tongue	At police headquarters, approximately 25 minutes after initial response	Acute dizziness (resolved), possible fentanyl exposure
3	Initial entry into room, detained and assisted subjects while maintaining scene security	Lightheadedness, dizziness, headache, blurry vision, feeling "high"	In the ambulance, approximately 90 minutes after initial response	Acute dizziness, possible fentanyl exposure
4	Handled camera and other items from the scene of the response and cleaned Officer 2's gear and vehicle; both activities at police headquarters	Lightheadedness, dizziness, weakness, headache, blurry vision, increased sweating, feeling of warmth, feeling "drunk"	At the police department, approximately 30–45 minutes after initially assisting with handling of camera	Dizziness, possible fentanyl exposure

Table C2. Schedule I and II substances identified by the forensic laboratory from specimens gathered at the scene of the response

Substance	Form	Weight* (grams)	Schedule
Dibutylone	Residue	—	I
N-ethylpentylone	Powder, solid material, residue	2.87	I
Heroin	Powder	0.14	I
Para-fluoroisobutyryl fentanyl	Residue	—	I†
Cocaine	Residue, liquid in syringe	—	II
Methamphetamine	Residue, liquid in syringe	—	II
Fentanyl	Powder, residue	0.14	II

*Does not include the weight of residues

†Temporary placement [Drug Enforcement Administration 2017]

Section D: References

Opioids

Armenian P, Vo KT, Barr-Walker J, Lynch KL [2017]. Fentanyl, fentanyl analogs and novel synthetic opioids: a comprehensive review. Neuropharmacology *134*(Part A):121–132, https://dx.doi.org/10.1016/j.neuropharm.2017.10.016.

Boyer EW [2012]. Management of opioid analgesic overdose. N Engl J Med *367*(2):146–155, http://dx.doi.org/10.1056/NEJMra1202561.

Centers for Disease Control and Prevention [2018a]. Overdose deaths involving opioids, cocaine, and psychostimulants – United States, 2015–2016. MMWR *67*:349–358, http://dx.doi.org/10.15585/mmwr.mm6712a1.

Centers for Disease Control and Prevention [2018b]. Rising numbers of deaths involving fentanyl and fentanyl analogs, including carfentanil, and increased usage and mixing with non-opioids. Health Alert Network Update 413. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Office of Public Health Preparedness and Response, https://emergency.cdc.gov/han/han00413.asp.

Drug Enforcement Administration [2017]. Schedules of controlled substances: temporary placement of 4-fluoroisobutyryl fentanyl into Schedule I. Temporary scheduling order. Fed Regist *82*(84):20544.

Howard J, Hornsby-Myers J [2018]. Fentanyls and the safety of first responders: science and recommendations. Am J Ind Med *61*:633–639, https://doi.org/10.1002/ajim.22874.

Interagency Board [2017]. Recommendations on selection and use of personal protective equipment and decontamination products for first responders against exposure hazards to synthetic opioids, including fentanyl and fentanyl analogues. Arlington, VA: Interagency Board, https://www.interagencyboard.org/content/first-responder-ppe-and-decontamination-recommendations-fentanyl-august-2017.

Lynch MJ, Suyama J, Guyette FX [2018]. Scene safety and force protection in the era of ultra-potent opioids. Prehosp Emerg Care *22*(2):157–162, https://doi.org/10.1080/10903127.2017.1367446.

Moss MJ, Warrick BJ, Nelson LS, McKay CA, Dubé P-A, Gosselin S, Palmer RB, Stolbach AI [2017]. ACMT and AACT position statement: preventing occupational fentanyl and fentanyl analog exposure to emergency responders. Clin Toxicol *56*(4):391–400, http://dx.doi.org/10.1080/15563650.2017.1373782.

NIOSH [2017]. Fentanyl: preventing occupational exposure to emergency responders. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, https://www.cdc.gov/niosh/topics/fentanyl/risk.html.

Ropper AH, Samuels MA, Klein JP, eds. [2014]. Adams and Victor's principles of neurology. 10th ed. New York: The McGraw-Hill Companies.

Suzuki J, El-Haddad S [2017]. A review: fentanyl and non-pharmaceutical fentanyls. Drug Alcohol Depend *171*:107–116, https://dx.doi.org/10.1016/j.drugalcdep.2016.11.033.

Cocaine

Aronson JK [2016]. Cocaine. In: Aronson JK, ed. Meyler's side effects of drugs. 16th ed. Waltham, MA: Elsevier.

Cathinones

Baumann MH, Solis, Jr E, Watterson LR, Marusich JA, Fantegrossi WE, Wiley JL [2014]. Bath salts, spice, and related designer drugs: the science behind the headlines. J Neurosci *34*(46):15150–15158, https://dx.doi.org/10.1523/JNEUROSCI.3223-14.2014.

Ellefsen KN, Anizan S, Castaneto MS, Desrosiers NA, Martin TM, Klette KL, Huestis MA [2014]. Validation of the only commercially available immunoassay for synthetic cathinones in urine: Randox Drugs of Abuse V Biochip array technology. Drug Test Anal *6*(7-8):728–738, http://dx.doi.org/10.1002/dta.1633.

Krotulski AJ, Papsun DM, De Martinis BS, Mohr ALA, Logan BK [2018]. N-ethyl pentylone (ephylone) intoxications: quantitative confirmation and metabolite identification in authentic human biological specimens. J Anal Toxicol *42*(7):467-475, https://dx.doi.org/10.1093/jat/bky025.

Illicit Drugs

Behrman AD [2008]. Luck of the draw: common adulterants found in illicit drugs. J Emerg Nurs *34*(1):80–82, http://dx.doi.org/10.1016/j.jen.2007.10.001.

Cole C, Jones L, McVeigh J, Kicman A, Syed Q, Bellis M [2011]. Adulterants in illicit drugs: a review of empirical evidence. Drug Test Anal *3*(2):89–96, http://dx.doi.org/10.1002/dta.220.

Liu L, Wheeler SE, Venkataramanan R, Rymer JA, Pizon AF, Lynch MJ, Tamama K [2018]. Newly emerging drugs of abuse and their detection methods: an ACLPS critical review. Am J Clin Pathol *149*(2):105–116, https://doi.org/10.1093/ajcp/aqx138.

Moeller KE, Kissack JC, Atayee RS, Lee KC [2017]. Clinical interpretation of urine drug tests: what clinicians need to know about urine drug screens. Mayo Clin Proc *92*(5):774–796, https://doi.org/10.1016/j.mayocp.2016.12.007.

Other

Johnson DL, Mead KR, Lynch RA, Hirst DVL [2013]. Lifting the lid on toilet plume aerosol: a literature review with suggestions for future research. Am J Infect Control *41*(3):254–258, http://dx.doi.org/10.1016/j.ajic.2012.04.330.

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