


Pilot Study on Risk Perceptions and Knowledge of Fentanyl Exposure Among New York State First Responders

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ABSTRACT

Objectives: The present opioid epidemic and abuse of fentanyl in the United States has led to an increased risk of exposure to first responders. Law enforcement, fire, and emergency medical services are receiving misinformation on fentanyl health and safety risks and this has led to miscommunication. Understanding the risk perceptions and knowledge of first responders regarding fentanyl can help identify training gaps.

Methods: A 15-item 6-point Likert scale online questionnaire was developed and distributed to firefighters, police officers, and emergency medical technicians, regarding perceptions of fentanyl exposure, and additional questions concerning knowledge. The online questionnaire was sent to 15 associations of national and New York State first responders with 3 associations acknowledging and distributing the survey.

Results: Of the 247 participants, 187 served New York State; 92 worked in law enforcement; and the other 95 worked in either fire, emergency medical service, or both. New York State first responders generally agreed with expert risk perceptions and knowledge of fentanyl exposure in the pilot study. Items pertaining to using hand sanitizer, selecting glove type, and dermal exposure to fentanyl had lower agreement with expert beliefs.

Conclusions: Risk perceptions and knowledge could be used to evaluate fentanyl response training among first responders.

Key Words: fentanyl, first responders, occupational chemical exposure, opioids

Fentanyl, a synthetic opioid, has long been used in the management of pain from chronic disorders, cancer, and severe discomfort.¹ The opioid epidemic, fueled by abuse of prescription opioids, has created demand for illegally manufactured opioids, including fentanyl. The introduction of fentanyl into the illicit drug supply has exacerbated the mortality associated with the opioid epidemic.² From 2016 to 2017, synthetic opioid-involved overdose death rates increased 45.2%.³

New York State's experience is similar to the nation's condition. New York State in 2016 would register 8.3 deaths per 100,000 people once adjusted for age, compared with 1.4 deaths per 100,000 in 2014 due to synthetic opioids other than methadone.⁴ The epidemic in New York State would not be limited to rural or suburban areas as New York City would also face increased rates of fentanyl-involved overdose deaths of almost 3,000% from 2014 to 2017.⁵

As overdoses have surged, first responders (police, emergency medical services [EMS], and fire) have been thrust into emergency scenes in which contact with extremely potent drugs is a possibility. These scenes include traffic stops, laboratory seizures, and overdose

scenes with unknown drugs in proximity. There are widely varying perceptions of hazard associated with exposure, complicated by the numerous forms in which fentanyl can appear.⁶

Initial concerns over hazards to responders may have been heightened by early warnings from law enforcement sources.⁷ Since these early concerns, guidance from authoritative sources places the risk of an overdose exposure to fentanyl by means of skin contact as very low in likelihood.^{8,9} Nonetheless, uncertainty over protection from fentanyl-containing drugs has contributed to anxiety and misinformation among first responders. As exposures have grown, sensational media reports reporting often nonspecific symptoms following casual exposure to suspect materials have become commonplace.¹⁰

To understand first responder risk perceptions and knowledge regarding fentanyl exposure and identify potential gaps in their training, a pilot survey of first responders was developed and launched in early 2019. The goal was to gather basic information that can be used to develop evidence-based interventions, including training programs, and to fill gaps in information for first responder perspectives on occupational exposure.

TABLE 1

| Agency Affiliation and Population Served | | | | | | |
|--|-----------------------------|---------|-----------|------------|-------------|----------|
| Discipline | Total Number of Respondents | <25,000 | 26-75,000 | 76-125,000 | 126-250,000 | >250,000 |
| Law enforcement | 92 | 41 | 25 | 9 | 3 | 14 |
| EMS | 55 | 9 | 8 | 6 | 5 | 27 |
| Fire/EMS dual role | 25 | 14 | 4 | 4 | 2 | 1 |
| Fire | 15 | 10 | 2 | 2 | 1 | 0 |
| Total | 187 | 74 | 39 | 21 | 11 | 42 |

METHODS

A questionnaire was developed by the authors based on a literature review of the main issues in communication and training that are needed within the first responder community toward fentanyl. Experts in the field of EMS, fire, and law enforcement validated the instrument for accuracy. The online instrument consisted of fifteen 6-point Likert scale items on risk perception, which ranged from strongly disagree, disagree, slightly disagree, slightly agree, agree, and strongly agree. Additional questions focused on knowledge and on demographics. An informed consent statement was incorporated into the opening page of the survey, and the project was granted an exemption by the John Jay College of Criminal Justice Institutional Review Board.

The survey was confidential both with regard to agency affiliation and personal identification, to protect the workers identity from being paired with their responses. The questionnaire was provided online using the platform Survey-Monkey®. The survey was available from February 1, 2019 to March 31, 2019. A flyer with the survey link and Quick Response (QR) code was distributed to 15 associations of fire, police, and emergency medical technicians within New York and nationally. An email and mailed cover letter was sent to each of the associations, for a total of 15 letters and 15 emails. The cover letter encouraged Chiefs to inform their members or employees about the survey. A flyer with the web link and QR code to the survey was posted in the authors' affiliated universities. The survey was also distributed informally by means of first responders affiliated with the institutions.

Due to confidentiality, the agencies did not have to formally acknowledge whether they will distribute the survey to their departments. The survey online platform does not allow the questionnaire to be opened again once taken from a specific device, reducing the likelihood of repeat responses from the same participant. Taking the questionnaire once was emphasized to the participants during the recruitment. All statistical analysis was performed using IBM® SPSS® Statistics Version 25.

While some limited statistical tests were performed, the goal of the survey was primarily descriptive in nature.

RESULTS

A total of 247 responses were received. Of these, 187 responses were from first responders serving New York State, while no other state registered more than 9 responses. Based on the small relative number of responses from outside New York State, it was decided to limit the analysis to New York first responders. As a diverse state with regard to community and agency size, the results offer some generalizability.

Of the 15 associations contacted for distribution, 3 acknowledged and responded that they would distribute the survey among first responders in their associations. The average time to complete the survey was approximately 5 min per respondent.

The 187 responses were mostly from law enforcement and EMS, with a smaller number of fire service respondents. In terms of agency service area and size of municipalities within the State, the law enforcement sample was fairly evenly distributed, while EMS was skewed toward large agencies of those serving population greater than 250,000 people. Agency affiliations and populations served are summarized in Table 1.

The sample was generally of personnel with significant experience, with a majority of all disciplines having more than 15 years of experience. Notably, 53.5% of EMS, law enforcement, and fire/EMS personnel had encountered fentanyl or suspected fentanyl in the course of their work.

A series of questions on general knowledge of fentanyl self-protection and symptoms of exposure were asked using a Likert scale. The results are summarized in Table 2.

Protective Measures

Ninety-two percent of personnel were aware that naloxone could be used to treat exposure to fentanyl. With regard to proper gloves for handling suspected fentanyl-containing substances, 61.5% of respondents selected "nitrile" gloves. Notably, 29.4% of respondents were "unsure" and another 9.1% selected "latex," both of which indicate a need for additional knowledge.

Regarding having adequate personal protective equipment (PPE) to protect them from fentanyl exposure, 76.1% of law

TABLE 2

Risk Perception Responses by Occupation

| Questionnaire items | EMS/Fire or dual | | Law enforcement | |
|---|--------------------|-----------------------|--------------------|-----------------------|
| | Agree <i>n</i> (%) | Disagree <i>n</i> (%) | Agree <i>n</i> (%) | Disagree <i>n</i> (%) |
| When working with fentanyl, I would not be concerned about needing emergency treatment for exposure | 26(27.4) | 69(72.6) | 6(6.5) | 86(93.5) |
| When working with fentanyl, I am not worried about protecting my eyes and face | 20(21.1) | 75(78.9) | 3(3.3) | 89(96.7) |
| Fentanyl has the same strength as morphine | 16(16.8) | 79(83.2) | 18(19.6) | 74(80.4) |
| When working with fentanyl, I would not be worried about having difficulty breathing | 26(27.4) | 69(72.6) | 2(2.2) | 90(97.8) |
| Fentanyl in pill form is safe to handle | 40(42.1) | 55(57.9) | 13(14.1) | 79(85.9) |
| I am concerned about covering my nose and mouth when working with fentanyl | 68(71.6) | 27(28.4) | 90(97.8) | 2(2.2) |
| I can see the signs and symptoms of an fentanyl overdose | 77(81.1) | 18(18.9) | 71(77.2) | 21(22.8) |
| It is safe to disturb fentanyl without PPE if you use caution | 12(12.6) | 83(87.4) | 5(5.4) | 87(94.6) |
| Gloves should be changed regularly when handling fentanyl | 83(87.4) | 12(12.6) | 80(87) | 12(13) |
| It is safe to eat, drink, or smoke when handling fentanyl | 3(3.2) | 92(96.8) | 2(2.2) | 90(97.8) |
| Briefly touching fentanyl could be deadly | 63(66.3) | 32(33.7) | 86(93.5) | 6(6.5) |
| You should not touch your face after handling fentanyl | 90(94.7) | 5(5.3) | 91(98.9) | 1(1.1) |
| Breathing airborne fentanyl is dangerous to my health | 86(90.5) | 9(9.5) | 92(100) | 0(0) |
| The only type of fentanyl that is a health risk to me is in the powder form | 17(17.9) | 78(82.1) | 2(2.2) | 90(97.8) |
| It is safe to use hand sanitizer after handling fentanyl | 37(38.9) | 58(61.1) | 24(26.1) | 68(73.9) |

enforcement personnel believed that they did not have access to proper PPE, while 55.8% of fire, EMS, or dual roles believed they did have access to the proper PPE.

Fire and EMS workers were nearly split in their responses to fentanyl in pill form being safe to handle, with 42.1% agreeing and 57.9% disagreeing. However, 85.9% of law enforcement disagreed that it was safe to handle fentanyl in pill form.

Information Sources

A series of questions were asked about what information sources were used by respondents to gather information on fentanyl exposure and safety measures. Respondents were

allowed to select “all that apply.” Specifically, 78.1% selected seminars or courses, 76.5% department training, 67.4% federal agencies, 46.0% professional or labor organizations, 23.0% social media or Internet pages, and 13.9% news media. It appears that a sizable majority relies on official sources for information, with specialized courses and departmental training being the most common.

DISCUSSION

First responders understand the need to protect their eyes, face, mouth, and nose. They understand fentanyl’s chemical property of being stronger than morphine and that it can come in many shapes and sizes, not just powder but also as liquids, pills,

sprays, gels, and adhesives. Our sample agreed that they can recognize the signs and symptoms of a fentanyl overdose, disagreed on disturbing fentanyl without personal protective equipment or PPE, and agreed that gloves should be changed regularly. They understand it is not safe to eat, drink, or smoke when handling fentanyl, nor is it appropriate to touch their face when handling fentanyl. Lastly, the sample agreed that difficulty breathing could be a risk of fentanyl exposure. The responses did not vary when compared across demographics.

Four main issues in comparison with expert beliefs include 32.6% agreeing that hand sanitizer is safe to use following fentanyl exposure. Hand sanitizer would in actuality spread the fentanyl and may increase absorption. Second, 38.5% of first responders could not identify nitrile as the appropriate glove type, placing a risk of dermal exposure to the study population. Third, miscommunication and misinformation may have led to 79.7% of responses agreeing that briefly touching fentanyl could be deadly. Research has shown that brief contact is not deadly, but instead we know that briefly touching fentanyl is not going to harm someone if that person washes the exposed skin surface thoroughly with soap and water. Instead the harm of touching fentanyl is more of chronic or long-term issue. This is more likely to occur in persons who regularly touch fentanyl or who are touching fentanyl for long extended periods of time.⁹ Lastly, we observed that law enforcement does not believe they are equipped with PPE to handle fentanyl exposure, while fire and EMS workers do.

To the author's knowledge, this is a first of its kind study to explore the risk perceptions and knowledge of first responders to fentanyl exposure. The survey allows for a rapid assessment of workers protective behavior with an average of 5-min response times. The instrument could be used to evaluate first responder's awareness to fentanyl exposure that could be used to develop or modify training.

Limitations

The study is limited by relying on self-reported data. While confidential, some participants may misrepresent their responses in comparison to their actual behavior in the field. Due to the information collected in the study potentially being harmful to the respondent if not confidential, an online survey was used that limited follow-up. However, further studies should consider using in-person data collection through systematic sampling.

Further studies should explore a wider sample size, aiming to observe other states and an overall national sample. Because the survey did not require agencies to declare if they would distribute the questionnaire, we are unable to ascertain the overall study base size. The option for the respondent to give follow-up information should be included to gather interviews or focus groups. Additional instrument items should be included to compare the intra-rater reliability between similar items for validation.

CONCLUSIONS

New York State first responders generally agreed with expert risk perceptions in the pilot study. However, items pertaining to using hand sanitizer, selecting glove type, and dermal exposure to fentanyl did not align with expert beliefs. Larger sample studies are needed to validate these findings and should be expanded nationally. Risk perceptions and knowledge could be used to evaluate fentanyl response training among first responders. The results and instrument can be further explored as a tool in analyzing first responder work practices, policies, and awareness during the continuously evolving opioid crisis. Knowledge gaps reflect a need for better training through authoritative sources, and a possible effect of overreliance on media reports of adverse effects on first responders from casual exposure to fentanyl or suspected fentanyl-containing materials.

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Authors' Contributions

The study was conceived by C.J., the instrument was designed by E.P. with review by C.J. Outreach and soliciting participants was done by E.P. and C.J. The data analysis and preparation of the manuscript, revision, and final approval were done by E.P. and C.J.

Institution and Ethics approval and informed consent

The study was reviewed by the John Jay College of Criminal Justice Institutional Review Board. The written informed consent and survey instrument were approved and granted an exemption under HRPP File Number 2018-1578.

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