

NDEWS *National Drug Early Warning System*

Funded at the Center for Substance Abuse Research by the National Institute on Drug Abuse

NDEWS New Hampshire HotSpot Studies: Overview and Initial Results

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Two NDEWS HotSpot Studies of Fentanyl in New Hampshire

The National Institute on Drug Abuse (NIDA) initiated a Cooperative Agreement with the Center for Substance Abuse Research (CESAR) at the University of Maryland in 2014 to create the Coordinating Center for the National Drug Early Warning System (NDEWS). NDEWS offers the unique ability to rapidly identify emerging drugs, including synthetic opioids such as fentanyl, and facilitate a more rapid and informed response to outbreaks and changes in substance use and misuse. One innovative component of NDEWS is the ability to launch rapid HotSpot studies of local drug outbreaks. NDEWS has launched a rapid HotSpot study of fentanyl-related overdose deaths in New Hampshire in two phases. In Phase 1, NDEWS researchers met with local scientists and practitioners in New Hampshire to produce a summary report about the fentanyl outbreak¹. With the support of NIDA to conduct Phase 2, NDEWS awarded sub-contracts to two local scientists to conduct additional studies. The first study involves systematic interviews of first responders, emergency department personnel, active fentanyl users, and individuals new to treatment (Lisa Marsch, PhD, Dartmouth, PI). The second study examines medical records and medical examiner investigations for persons who died from fentanyl-related overdoses in New Hampshire (Marcella Sorg, PhD, University of Maine, PI). Part of this study involves the analysis of urine specimens collected by the New Hampshire Office of the Chief Medical Examiner from persons who died from a fentanyl-related drug overdose. This study is described below.

First Findings from NDEWS Urinalyses

The New Hampshire Office of Chief Medical Examiner provided NDEWS HotSpot researchers with 136 urine specimens from persons who were autopsied after a fatal fentanyl-related overdose. The specimens are from deaths occurring between January 2015 and September 2016. Because younger persons are more likely to be autopsied, these specimens are not representative of all persons who died from a fentanyl-related overdose. These specimens were sent by NDEWS to our collaborating laboratory, the Armed Forces Medical Examiner System laboratory (AFMES), who tested each specimen for more than 150 drugs using LC/MS/MS.

Table 1 shows that 98% of the specimens tested positive for any form of fentanyl. Some fentanyl deaths occur very quickly, reaching the blood before metabolites reach the urine. In addition, 52% tested positive for a non-fentanyl opioid. Marijuana and cocaine were identified in more than one-third of the specimens. Most specimens contained drugs in addition to fentanyl: 60% contained three or more drugs or drug categories (of 7). Table 2 shows that these specimens contain an average of 2.88 drugs/drug categories and multiple drugs/drug categories were found in specimens from males and females and at all age levels.

These results underscore the importance of obtaining an extensive medical and drug use history for decedents with a suspected fentanyl-related overdose, as with all other drug deaths. Because drugs may interact synergistically, medical examiner guidelines include mention of all co-intoxicants on the death certificate. Subsequent analyses will compare the urinalyses and blood toxicology results, as well as report fentanyl levels associated with these deaths.

¹ NDEWS Coordinating Center. 14 October 2016. NDEWS New Hampshire HotSpot Report: The Increase in Fentanyl Overdoses. Available online at www.ndews.org under Project Publications.

Table 1: Percentage of Urine Specimens that Tested Positive for 7 Drugs/Drug Categories

(N=136 urine specimens collected from fentanyl-caused overdose deaths by New Hampshire Office of the Chief Medical Examiner)

| 7 Drugs/Drug Categories | Positive % |
|---|-------------------|
| Any Fentanyl [◇] | 98% |
| Any Non-Fentanyl Opioid [◇] | 52 |
| Marijuana | 38 |
| Cocaine | 37 |
| Any Benzodiazepine [◇] | 28 |
| Any Antidepressant [◇] | 24 |
| Any Amphetamine [◇] | 10 |
| Number of Drugs/Drug Categories Detected in each Specimen (of 7) | |
| 1 | 12% |
| 2 | 28 |
| 3 | 31 |
| 4 | 20 |
| 5 | 9 |
| Total | 100% |
| Mean Number of Drugs/Drug Categories Detected per Specimen | 2.88 |

Notes:

[◇] Any Fentanyl includes: Fentanyl, Norfentanyl, 4-ANPP (Despropionyl fentanyl), Acetylfentanyl, Furanylfentanyl.

Any Non-Fentanyl Opioid includes: Morphine, Oxycodone, 6-Monoacetylmorphine (6-MAM), Codeine, Norbuprenorphine, Oxycodone, Tramadol, Buprenorphine, Hydrocodone, Hydromorphone, Methadone (EDDP), Tapentadol.

Any Benzodiazepine includes: 7-Aminoclonazepam, α -Hydroxyalprazolam, Alprazolam, Nordiazepam, Oxazepam, Temazepam, Lorazepam, Clonazepam, Demoxepam, Diazepam.

Any Antidepressant includes: Trazodone, Citalopram, Sertraline, Bupropion, Desmethylvenlafaxine/Desvenlafaxine, Amitriptyline, Nortriptyline, Paroxetine, Venlafaxine, Fluoxetine.

Any Amphetamine includes: Amphetamine, Methamphetamine, MDMA.

Research conducted by the National Drug Early Warning System (NDEWS) with specimens provided by the New Hampshire Office of the Chief Medical Examiner to Marcella Sorg, PI. NDEWS is funded under NIDA Cooperative Agreement DA038360 awarded to the Center for Substance Abuse Research at the University of Maryland, College Park.

Table 2: Mean Number of Drugs/Drug Categories (of 7)^ Detected in Each Specimen, By Gender and Age

(N=136 urine specimens collected from fentanyl-caused overdose deaths by New Hampshire Office of the Chief Medical Examiner)

| Gender | Mean Number of Drugs/Drug Categories (of 7)^ |
|--------------------------------|---|
| Male (N=104) | 2.83 |
| Female (N=32) | 3.03 |
| Age | |
| 17-25 (N=27) | 3.11 |
| 26-30 (N=20) | 2.50 |
| 31-35 (N=22) | 2.86 |
| 36-44 (N=26) | 2.88 |
| 45-50 (N=20) | 3.00 |
| 51+ (N=21) | 2.81 |
| Total Specimens (N=136) | 2.88 |

Notes:

^The 7 Drugs/Drug Categories include: Any Fentanyl, Any Non-Fentanyl Opioid, Marijuana, Cocaine, Any Benzodiazepine, Any Antidepressant, and Any Amphetamine.

Any Fentanyl includes: Fentanyl, Norfentanyl, 4-ANPP (Despropionyl fentanyl), Acetylfentanyl, Furanylfentanyl.

Any Non-Fentanyl Opioid includes: Morphine, Oxycodone, 6-Monoacetylmorphine (6-MAM), Codeine, Norbuprenorphine, Oxycodone, Tramadol, Buprenorphine, Hydrocodone, Hydromorphone, Methadone (EDDP), Tapentadol.

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