



K71 A Comparison of Syringe Contents to Respective Biological Counterparts in 43 Medical Examiner Cases

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Learning Overview: At the end of this presentation, attendees will be better positioned to explore alternative strategies for determining the prevalence of New Psychoactive Substances (NPS).

Impact on the Forensic Science Community: This presentation will impact the forensic science community by encouraging toxicologists to evaluate scene paraphernalia in parallel with autopsy specimens from apparent accidental drug overdose cases. The correlation between the sets of data may provide toxicologically relevant information as well as prevalence information.

From March of 2017–present, the District of Columbia Medical Examiner has sought to preserve and solicit testing of syringe residues in an effort to identify emerging drugs of abuse. Results presented and discussed are from March 2017–March 2018.

Sixty-three syringes and other paraphernalia were collected from apparent accidental drug overdose investigative scenes in 43 medical examiner cases. In some instances, multiple syringes were collected per case. Two laboratories were employed. One laboratory analyzed the syringe residues for controlled substances and the second laboratory analyzed autopsy specimens for drugs of abuse.

First, a qualitative method developed to identify 21 fentanyl analogs, designer opioids, naloxone, and nalorphine by Ultra Performance Liquid Chromatography-Tandem Mass Spectrometry (UPLC-MS/MS) was validated in accordance with the Scientific Working Group for Forensic Toxicology (SWGTOX). In this method, postmortem blood and/or urine were subjected to liquid extraction. A reverse phase gradient was applied using ammonium formate (5mM, pH 3) and 0.1% formic acid in acetonitrile to achieve chromatographic separation by use of an Waters® Acquity® UPLC BEH C18 2.1mm x 50mm, 1.7µm analytical column coupled to a Waters® Acquity® UPLC I-Class system. Mass spectral identification was conducted via a Waters® Acquity® TQ Detector.

The second laboratory implemented analysis of syringe contents for controlled substances via Cobalt Thiocyanate color testing followed by Gas Chromatography/Mass Spectrometry (GC/MS) testing. Both methods are consistent with the Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) protocol. Bulk liquids and/or residues were emptied into appropriate containers followed by a syringe wash using a small volume of methanol (~250µL–500µL). If blood was present in the syringe barrel, chloroform was the solvent of choice. The organic layers of the extracts were then used to perform cobalt thiocyanate color testing and GC/MS analysis.

Of the 63 syringes (43 cases) that were collected between the periods, 76% of syringe contents correlate to postmortem blood and/or urine that contained fentanyl, a fentanyl analog, designer opioid, and/or opioid receptor antagonists. Of these syringes, the most common substance was fentanyl (64%), followed by furanyl fentanyl (28%). Other fentanyl analogs detected include para-fluoroisobutyryl/FIBF (8%), U-47700 (8%), methoxy acetyl fentanyl (4%), and despropionyl fentanyl (4%). Additionally, opiates and cutting agents, such as noscapine, caffeine, and diphenhydramine, were detected as well.

The analysis of paraphernalia can yield information of toxicological importance when trying to gain understanding about the prevalence of NPS when little to no information is present. However, the detection of the same compound in both paraphernalia and autopsy specimen is not guaranteed. These types of surveys may help the community better understand the relationship between metabolites and parent compounds. Although evaluated on a small scale, fentanyl and furanyl fentanyl seem to be prevalent in the drug overdose cases involved and, similarly, conclusions can thus be made about prevalence in Washington, DC. Knowledge about these substances can be used as a public health tool for education regarding misuse of these substances.

Fentanyl Analogs, Postmortem, Paraphernalia