K1 Patterns of Drug Use in a Suicide Population by LC-TOF Analysis of Whole Blood Samples for Common Therapeutic, Abused, and Novel Psychoactive Drugs

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After attending this presentation, attendees will be able to apply knowledge about demographics and patterns of drug use related to cause and manner of death in a cohort of subjects who successfully committed suicide by a variety of means. Additionally, attendees will be able to assess the value of performing drug screening in suicide cases that are not apparent drug overdoses.

This presentation will impact the forensic science community by increasing the knowledge about patterns of drug use in a suicide population including the presence or absence of recently emerging novel psychoactive substances ("Bath Salts").

Due to the increase in use, legal complications, and potentially dangerous effects of these designer drugs, obtaining a better understanding of their prevalence is an important insight for coroners and medical examiners. Currently, pathologists and coroners have highly variable policies when it comes to toxicology testing of cases deemed a suicide in which there is clear trauma (Gunshot Wounds (GSWs), hangings, blunt force injuries, etc.). Cases considered suicides will often include a partial autopsy but no toxicology screen. This is a result of a combination of a lack of resources together with a lack of understanding of the role played by prescription or abused drug use in suicidology. Helping develop this knowledge base will assist with the development of more uniform standards for death investigation. Over a 12-month period (2012-2013), blood samples were collected for sequential cases determined to be suicides (n=145). Apparent drug-related deaths (n=22) had previous toxicology studies performed, while the remainder (n=123) did not.

Using a Liquid Chromatography-Time Of Flight (LC/TOF) screening method, the 145 subject samples were screened with both a standard toxicology panel and a novel psychoactive-substances screening panel (stimulants) using LC/TOF methods. The method tested for 305 commonly encountered drugs and their metabolites in the categories, including drugs of abuse and therapeutics. The scope did not include tetrahydrocannabinol (THC). The samples were tested for alcohol by Headspace/Gas Chromatography/Mass Spectrometry (HS/GC/MS). Method validation was performed, followed by quantitation of the samples containing the synthetic stimulants. The results were examined for patterns and relative frequencies of drug use within different causes of death, race, sex, and age.

The subjects ranged from 13 to 95 years of age (mean=44.8 and median=44). Four of the subjects were minors under the age of 18 years with the youngest being 13 years old. In two of the four subjects under 18 years of age, no significant drugs were found. Desmethylsertraline was found in the 13-year-old while acetaminophen, dihydrocodeine/hydrocodol, ephedrine/pseudoephedrine, fluoxetine, hydrocodone, lamotrigine, lorazepam, methylphenidate, trazodone, and ziprasidone were found in the 16-year-old. The majority of subjects were listed as Caucasian (80.7%). Based on a 2012 estimate, 67.1% of the population in Marion County is Caucasian (includes persons reporting only one race).

The drugs detected were categorized into 17 groups: Alzheimer's disease medication; anticoagulant; anticonvulsant; antidepressant; antihistamine; antipsychotic; benzodiazepine; cardiac drug; Erectile Dysfunction (ED) drug; hallucinogen; muscle relaxant; narcotic analgesic; opioid antagonist; sedative; sleep medication; Selective Serotonin Reuptake Inhibitor (SSRI); and stimulant. The categories with the highest prevalence were narcotic analgesics (28.3%: dihydrocodeine/hydrocodone (n=16); oxycodone (n=10); and fentanyl (n=8)), benzodiazepines (22.8%: diazepam (n=9); alprazolam (n=8); and lorazepam (n=7)), and stimulants (19.3%: amphetamine (n=7); hydroxybupropion (n=7); and cocaine (n=6)).

The causes of death were broken down into six categories: GSW (49.0%); asphyxia (24.8%); drug intoxication/Overdose (OD)/toxic chemicals (16.6%); Carbon Monoxide (CO) inhalation/fire death (4.8%); sharp force injury (2.8%); and blunt force injury (2.1%). There were a significantly higher number of male subjects (n=117, 80.7%) than females (n= 28, 19.3%). Within the GSW deaths, the most frequently encountered drugs were oxycodone (n=7), hydrocodone (n=7), and diazepam (n=6). GSW was the most prevalent of groups with 71 cases, 59.2% of which contained drugs. Asphyxia deaths were the second most common with a total of 36 cases, with 58.3% containing drugs. Within the deaths by asphyxia, the most frequently encountered drugs were amphetamine (n=5) and hydroxybupropion (n=3). Drug intoxication/OD/toxic chemicals made up 24 cases, with 95.8% of the cases containing drugs. The most prevalent drugs in this category were alprazolam (n=6), dihydrocodeine/hydrocodol (n=6), and hydrocodone (n=6).

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Synthetic Stimulants, Suicide, Drug Overdose

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