K38 Two Pediatric Methadone Fatalities: Case Reports From the Office of the Medical Examiner, Phoenix, Arizona

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After attending this presentation, attendees will be afforded a review of two recent pediatric methadone related deaths.

This presentation will impact the forensic community and/or humanity by demonstrating that these analytical results will contribute to the limited data available on pediatric methadone cases.

The authors will present information about two recent pediatric deaths attributed to methadone toxicity. The analytical results presented are significant for their contribution to the limited data on methadone in a pediatric population.

Methadone, a synthetic opioid, was first synthesized by German scientists during World War II. It became clinically available in the United States in 1947 for treatment of narcotic addictions and later used for the treatment of chronic pain. Despite concern about the increased prescription of methadone and methadone related deaths, there is little information about incidence and associated toxicity in children. Prior use and cellular tolerance is of particular significance in evaluating upload blood concentrations. As documented in the literature, blood concentrations in a fatal overdose can vary greatly, with overlapping therapeutic and lethal ranges.

Case #1: A 12-year-old female was found unresponsive in her bedroom by family members. Emergency medical personnel were summoned, but resuscitation efforts were unsuccessful and death was pronounced at the scene. A full autopsy was performed approximately 55 hours after death was pronounced. Significant findings were elevated lung and brain weights consistent with edema. Pleural fluid, bile, vitreous fluid, gastric contents, liver, spleen, and brain were collected and submitted for toxicological analysis. Volatiles were assayed by GC- FID. Ethanol was present in the vitreous fluid at 0.01 g% and 0.07 g% in the pleural fluid. The blood was screened by ELISA for benzodiazepines, barbiturates, benzoylecgonine, opiates, and methamphetamine with negative results. The blood and bile specimens were subjected to a qualitative analysis for basic drugs. Methadone and metabolites were confirmed by GC/MS. The methadone was quantitated by GC-NPD in all specimens with results as follows: Pleural fluid 0.70 mg/L, liver 5.98 mg/kg, spleen 3.43 mg/kg, brain 1.15 mg/kg, and gastric contents 111.27 mg/L. The cause of death was determined to be methadone toxicity, and the manner of death was ruled a suicide.

Case#2: A 5-year-old male was found unresponsive in bed by his father. Emergency medical personnel were summoned, but resuscitation efforts were unsuccessful, and death was pronounced at the scene. A white foam cone from the nose and a reddish purge from the mouth were noted by medical examiner personnel. The decedent's prior medical history includes recent fever and congestion, autism, and asthma. A full autopsy was performed approximately 24 hours after death was pronounced. Significant findings include marked cerebral edema, heavy lungs, and an enlarged heart. At autopsy, cardiac blood, urine, bile, vitreous fluid, and gastric contents were collected and submitted for toxicological analysis. Volatiles were assayed by GC-FID with negative results. The blood was screened by ELISA for benzodiazepines, barbiturates, benzoylecgonine, opiates, and methamphetamine with negative results. The blood and urine specimens were then subjected to a qualitative analysis for basic drugs. The analytical findings are as follows: Methadone and metabolites were confirmed by GC/MS. The methadone was quantitated by GC-NPD and the concentration was found to be: Cardiac blood 0.34 mg/L, urine 8.36 mg/L, bile 0.63 mg/L, and gastric contents 23.8 mg/L. Also present in the cardiac blood were: Doxylamine 0.36 mg/L, Dextromethorphan 0.24 mg/L, and Acetaminophen 69.0 mg/L. The cause and manner of death are pending in this case, as it is still under investigation.

In both cases, a quantitative analysis of methadone consisted of a basic pH butyl chloride extract of sample and mepivacaine internal standard analyzed on an Aglient 6890 GC equipped with a nitrogen phosphorous detector (NPD). Analytical conditions consisted of a 260º C split injection (7:1) on to a 25m J&W Ultra 2 column programmed at 60º (1 minute) -10º/minute -315º (5.5 minutes). The concentration of methadone was determined by comparing the peak area ratios of methadone to the internal standard against a standard 4 point calibration curve. Linearity was demonstrated up to 1.0 mg/L, with fractional volumes being used for samples exceeding linearity.

A discussion of case circumstances will include past pediatric methadone cases, ruled undetermined and accidental, covering the ranges of 0.07 mg/L-0.46 mg/L toxicity levels of this synthetic narcotic.

Methadone, Pediatric, Fatalities

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