K12 Methadone-Related Deaths: A Six-Year Study in a Major Italian City

Stefano Errico, Genova, ITALY; Davide Bedocchi, MD, Istituto Di Medicina Legale E Delle Assicurazioni, Genova 16132, ITALY; Martina Drommi*, Genova 16132, ITALY; Rosario Barranco*, University of Genova, Department of Legal Medicine, Genova 16132, ITALY; Alessandro Bonsignore, MD, PhD*, University of Genova, Genova, Liguria 16132, ITALY; Francesco Ventura, MD*, Department of Legal Medicine University of Genova, Genova 16132, ITALY*

Learning Overview: After attending this presentation, attendees will learn about the risks of self-administration of methadone to counter heroin abuse.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing the relevance of carrying out a complete autopsy examination, supported by histological and toxicological evaluations, in patients with methadone therapy, in order to identify the real cause of death and the contemporary consumption of other drugs. This presentation will also impact the forensic science community by underlying the implication of the increase in illegal sales of substances for self-administration together with methadone as a substitutive therapy and related risks in non-addicted patients.

Methadone is a synthetic opioid, a pure agonist of the μ receptor. It has the advantages of high oral bioavailability, long half-life, absence of active metabolites, and low cost. Like other opioids, methadone causes addiction and tolerance. Side effects of methadone are pulmonary edema and respiratory depression, particularly in the chronic abuser, and ventricular arrhythmia in those subjects who consume it in high doses for illicit use. In Italy, methadone is commonly distributed by the National Health System for heroin substitutive therapy in addicted patients. Dedicated structures provide methadone for these patients. In the past years, national studies of incidence and prevalence have demonstrated an increase in illegal sales of methadone and, consequently, also an increase in deaths due to acute methadone intoxication.

This study included 31 subjects' deaths due to methadone consumption: 25 were male and 6 females. Eleven subjects (36%) were under substitutive treatment at the time of death, 3 subjects were previously monitored, and 11 subjects were unknown to the addiction therapy system. In all cases, a complete autopsy was performed and blood samples were collected for toxicological analysis using gas chromatography/mass spectrometry.

The concentration range of methadone in the blood samples was 46 to 4,058.53ng/mL, with an average of 821.46ng/mL. The range in patients under substitutive treatment was 61.8 to 4,058.53ng/mL, with an average of 1,148.86 ng/mL. The range in other subjects was 46 to 1,830ng/mL, with an average of 614.68 ng/mL. Five subjects presented a single positivity to methadone (three were followed by the National Health System, with an average concentration of 2,028.51ng/mL and the other two with an average methadone concentration of 1,166.5ng/mL). Other subjects were positive for different drugs or substances in sub-lethal concentrations: 13 subjects with alcohol, 11 with cocaine, 7 with benzodiazepines, 5 with other opioids, 2 with tetrahydrocannabinol, 3 with neuroleptics, 1 subject with serotonin re-uptake inhibitors and 1 with barbiturates; 84% of patients were positive for at least two substances.

Such results of methadone concentrations correspond to known lethal dosages. According to the literature, usual consumers of methadone develop a much higher tolerance than subjects who take it for illicit use.

The substitutive therapy with methadone is effective and works properly, but illegal sales and consumption of methadone, which has increased in recent years, can have a negative impact on self-administration of opioid addiction treatment therapies, inducing patients who enhance their own doses; moreover, it produced a rise in methadone-related deaths. Accordingly, careful monitoring of doses administrated to patients is requested to make the system safer. In this context, a systematic urinary research of sucrose and lactose (disaccharides), in order to discover—with a high degree of reliability—the route of administration, could represent a medicolegal contribution to contrast and identify illegal intravenous methadone intake and related deaths.

Methadone, Forensic Toxicology, Drug Addiction