



## K57 Buprenorphine-Related Deaths in North Carolina From 2010 to 2018

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**Learning Overview:** After attending this presentation, attendees will understand the epidemiology and the increase in buprenorphine deaths in North Carolina and will gain an appreciation of the pharmacology of buprenorphine in combination with other Central Nervous System Depressant (CNSD) substances, including therapeutic prescription medication. In addition, attendees will understand how analytic, autopsy, and investigation information may be critical to determine cause of death in challenging buprenorphine toxicity cases.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by increasing awareness of the complex mechanism of action of buprenorphine and norbuprenorphine. The additive effects of CNSDs, especially those drugs that interact with P-glycoprotein (P-gp), will be discussed. This will improve the understanding and interpretation of postmortem buprenorphine cases and emphasize the need for correlation with death investigation information.

Between 2010 and 2018, there were more than 100 cases in which buprenorphine was detected in the peripheral blood and considered the cause of death with *no other opioids* or substances found in the supratherapeutic range. Of these cases, 65% were male. The ages of decedents varied widely, with a range of 14–63 years. The mean/median peripheral blood concentrations for parent and metabolite were 4.5/2.3ng/mL and 8.2/3.5ng/mL, respectively. These concentrations overlap those reported in the literature for opioid-dependent subjects receiving sublingual maintenance therapy. The route of administration, if available, scene findings, and decedent behavior prior to death were strongly considered by the pathologist for each case to provide context to the drug cause of death. For these data, a query was performed in the North Carolina Controlled Substances Reporting System for each decedent. For this particular set of buprenorphine cases, the decedents would have presumably survived the ingestion of other CNSDs, or therapeutic medications, if not for the presence of buprenorphine and its metabolite.

A majority of the buprenorphine deaths involve decedents with underlying cardiovascular disease. This raises the possibility that individuals with underlying cardiovascular disease may be more susceptible to the toxic effects of buprenorphine. While safer than other opioid alternatives, buprenorphine may not be void of effects on the heart, especially when not used as prescribed, and thus predispose individuals with heart conditions to an untimely death.

Determining cause of death in buprenorphine-related cases can be difficult. Deaths from buprenorphine may be underestimated in epidemiological data because of the lack of a defined toxic or lethal range involving a drug with a good safety profile, especially when compared to other opioids used for medication-assisted treatment. As the treatment of opioid-use disorder becomes a priority, more awareness of the challenges of postmortem interpretation is needed in the forensic community as increased use and diversion of buprenorphine are inevitable.

### **Buprenorphine, Postmortem, Opioid**