

## K19 A Four-Year Comparison (2016–2019) of Toxicology Results in Suicide-Related Deaths From the West Tennessee Regional Forensic Center in Memphis, Tennessee

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**Learning Overview:** The goal of this presentation is to review any trends in substance use and suicide in cases from the West Tennessee Regional Forensic Center between the years 2016 to 2019.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by showing recent trends in toxicology results in suicides as well as help as a starting point for health care providers to approach concerns for suicide in their patients based on their substance abuse history.

Suicide rates have been increasing over the past two decades.<sup>1</sup> While substance abuse has been identified as a potential warning sign for suicide by the Centers of Disease Control, in recent years, few studies have examined the correlation between suicides and forensic toxicology results in the United States.<sup>2,3</sup> The current study reviewed toxicology profiles from known suicide cases examined at the West Tennessee Regional Forensics Center in Memphis, TN, from 2016 to 2019. The purpose of this research was to examine if any trends exist between substance use and suicide, including any trends in cause of death.

Toxicology reports from known suicides from 2016 to 2019 were reviewed, and age, sex, race, and cause of death were recorded. Cases without toxicology analysis and incomplete cases were excluded. The major categories for cause of death were gunshot wounds, asphyxia-related deaths, drug intoxication, blunt force trauma, sharp force trauma, and drowning. Age-based categories were made in ten-year increments. Toxicology results positive for common substances and drugs of abuse, alcohol, prescription drugs, and over-the-counter drugs were considered in this study. A total of 512 cases fit the above criteria in the time course examined.

Analysis of the data revealed 69.3% of cases detected substances in toxicology analysis. Of the 512 cases with toxicology reports from 2016–2019, 390 cases were male, which matches the overall trend for sex in suicides in the United States to be more common in males.<sup>1</sup> The most common toxicology result was the detection of multiple substances (33.2%), with alcohol being the most common substance detected (29.9%). Negative toxicology (30.6%) and Tetrahydrocannabinol (THC) (20.5%) were the next most common toxicology results found. Negative toxicology was the most common result found for those aged 70 and older (53.4%) as well as the second most common result in those aged 29 and younger (22.3%). Toxicology for THC was the most common result in those under 19 years of age (30.9%) as well as the third most common among those aged 20–29 (17.3%). Alcohol was one of the highest toxicology results for ages 20–69 (21.4%). Self-inflicted gunshot wounds were the most common cause of death (325 out of 512 cases). In these cases, negative toxicology (35.7%) was the most commonly found with alcohol (30.1%) being the second most common result. Hangings (101 out of 512) more commonly had multiple substances (33.7%) on toxicology followed by negative toxicology analysis (29.7%). The most common results in positive toxicology studies were THC, benzodiazepines, opioids, amphetamines, and cocaine.

Interesting trends were also detected in that opioids increased from 2016 to 2019, while benzodiazepines decreased over the same period. Only a minority of cases were positive for prescription antidepressants and anti-psychotics (9.9%); however, this result may be skewed due to the type of toxicology panel performed. Overall, these results show that toxicology in suicides is a topic that needs more research as well as a possible starting point for health care providers to approach concerns for suicide or suicidal ideations in patients based on their substance abuse history.

### Reference(s):

1. Hedegaard, Holly, Curtin, Sally C, and Warner, Margaret. Increase in suicide mortality in the United States, 1999–2018.” *NCHS Data Brief*, no 362. (April 2020): 1-7. Hyattsville, MD: National Center for Health Statistics. 2020. <https://www.cdc.gov/nchs/data/databriefs/db362-h.pdf>.
2. *CDC Vital Signs: Suicide rising across the US*. Last updated June 07, 2018. Accessed: August 24, 2020. <https://www.cdc.gov/vitalsigns/suicide/>.
3. Toxicology Testing and Results for Suicide Victims—13 States, 2004. *MMWR* 55, no. 46 (November 24, 2006): 1245-1248. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5546a1.htm>.

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### Toxicology, Suicide, Substance Abuse