

Suicides by Sodium Nitrite Reported to America's Poison Centers: 2020–2023

Anita Mudan, MD, and Jacob A. Lebin, MD

Sodium nitrite is an industrial chemical with broad uses in industry and food preservation. Ingestion of sodium nitrite results in methemoglobinemia, causing fatal tissue hypoxia.¹ It has emerged as a novel method of suicide, particularly among young adults, with significant mortality.^{2,3} Using the America's Poison Center's (APC) National Poison Data System (NPDS), we previously reviewed intentional ingestions of sodium nitrite from 2009–2019 and documented a 3-fold increase in reported cases between 2018 and 2019.⁴ Due to increased public awareness surrounding sodium nitrite suicide attempts, we conducted a follow-up retrospective review of intentional sodium nitrite ingestions utilizing the NPDS.

Methods

This is a retrospective review of all intentional sodium nitrite ingestions reported to the NPDS from January 1, 2020, through December 31, 2023. The NPDS database prospectively collects data from all 55 U.S. poison centers. We queried the NPDS for all single substance exposures involving the APC category code for “nitrates or nitrites” (034260). Cases were then manually reviewed by both authors and included if involving sodium nitrite and if the reason for exposure was coded as intentional (suspected suicide or unknown) and unknown. Agreement between both authors was necessary for inclusion. This study was deemed institutional review board exempt and was approved by APC.

Results

Over the study period, there were 172 individual nitrite or nitrate exposures and 106 cases that met inclusion criteria. The number of cases

peaked at 39 in 2022, with a drop to 29 in 2023 (Figure 1). The mean age was 23.2 years old (range 16–56), and the cases were predominantly male (63.2%). Case fatality was 41.5% (n = 44).

Discussion

In this review of intentional sodium nitrite ingestions reported to the NPDS, we identified an additional 106 cases and 44 fatalities. While it is difficult to determine the reasons for the overall increase between 2020 and 2023, albeit with some variability year to year, several factors are likely contributing. The first is access to online communities, such as Sanctioned Suicide, that promote and share recommendations for internet-assisted suicide.^{5,6} These forums often give detailed instructions regarding how to procure, prepare, and administer sodium nitrite for suicide.⁷ They can create potentially harmful environments where people in emotional distress may promote risky behavior and encourage each other to act on harmful impulses.⁸

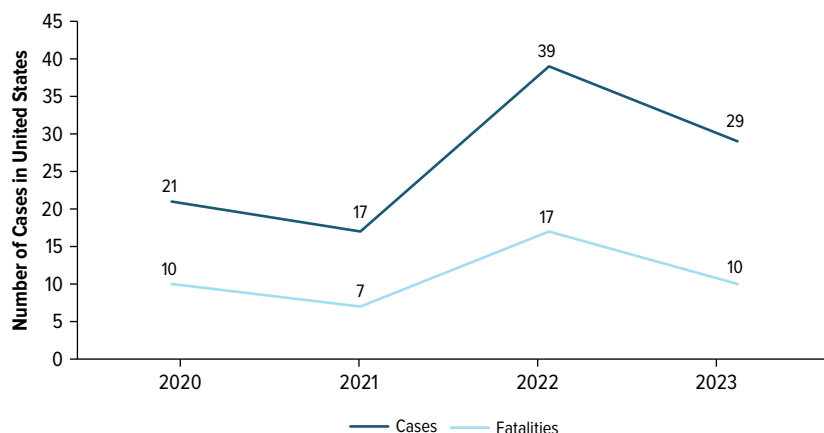
Another factor is the relative ease of access through online vendors. Currently, sodium nitrite is available in the US via multiple online retailers, as it is a legal, commercial ingredient. Thus, there are few restrictions around its sale, which allows individuals to purchase sodium nitrite with minimal safeguards.⁹ An illustrative example is a recent Washington state lawsuit, *McCarthy v. Amazon.com*, regarding the liabilities of online marketplaces surrounding sales of sodium nitrite used in several teenage suicides.¹⁰

Efforts to limit access to lethal suicide methods, also called means restriction, have been reported as a public health strategy for suicide

prevention.¹¹ The United Kingdom and the Netherlands have attempted to curtail access to sodium nitrite by requiring distributors to report suspicious transactions.³ Similarly, The Youth Poisoning Protection Act, introduced to the US Congress in 2023, aims to prohibit sales of highly concentrated sodium nitrite to individuals and would create felony penalties for those who knowingly sell highly concentrated sodium nitrite products.¹² On the state level, New York (NY State Senate Bill S582) and California (Tyler's Law—Assembly Bill No. 1109) have enacted laws restricting the sale of sodium nitrite to persons under the age of 21 or 18 years, respectively.^{13,14} Indeed, several vendors have since voluntarily removed sodium nitrite from their sites. The balance is challenging, however, as means restriction can also be seen as intrusive. Moreover, demonstrating means restriction effectiveness can be difficult when sodium nitrite poisonings comprise only a tiny fraction of total suicides.¹⁵

This study shares many of the same limitations as other NPDS studies. By using a national database, we relied on the accuracy and integrity of the available, coded data. We did not request or review individual reports or hospital records and, thus, are unable to verify the accuracy of the specific product or clinical details. Importantly, NPDS database makes no distinction between clinical information obtained from a patient's family or provided by a trained toxicologist. Cases are reported to poison control centers on a voluntary basis, leading to significant variability in call volume and types of cases based on local practice patterns, resulting in reporting bias.¹⁶ Finally, fatalities are likely underestimated as death from

Figure 1.
Intentional Sodium Nitrite Exposures Reported to the NPDS, 2020–2023



Abbreviation: NPDS = National Poison Data System.

sodium nitrite is sudden, often with no prehospital, hospital, or poison center based interventions, and thus are not included in the NPDS.

Despite increased public awareness, fatal sodium nitrite exposures continue to increase. However, they still represent a small percentage (<1%) of all suicides.⁸ This trend highlights ongoing tension between sodium nitrite accessibility and potential regulation of its sale. Education measures to physicians and other appropriate crisis response groups will likely be of public health benefit.

References

- Price DP. Methemoglobin inducers. In: Nelson LS, Howland MA, Lewin NA, et al, eds. *Goldfrank's Toxicologic Emergencies*. McGraw-Hill Education; 2019:1703–1712.
- Hickey TBM, MacNeil JA, Hansmeyer C, et al. Fatal methemoglobinemia: a case series highlighting a new trend in intentional sodium nitrite or sodium nitrate ingestion as a method of suicide. *Forensic Sci Int*. 2021;326:110907.
- McCann SD, Kennedy JM, Tweet MS, et al. Sodium nitrite ingestion: an emerging trend in suicide attempts shared via online communities. *J Emerg Med*. 2021;60(3):409–412.
- Mudan A, Lebin JA, Smolin CG. National Poison Data System (NPDS) review of intentional sodium nitrite ingestions 2009–2019. *Toxicol Commun*. 2021;5(1):147–152.
- Dinis-Oliveira RJ, Durão C. When the antidote for cyanide poisonings becomes a nightmare: an alarming outbreak of suicides using kits containing sodium nitrite. *Forensic Sci Res*. 2023;8(2):170–171.
- Das S, Walker D, Rajwal S, et al. Emerging trends of self-harm using sodium nitrite in an online suicide community: observational study using natural language processing analysis. *JMIR Ment Health*. 2024;11:e53730.
- Durão C, Pedrosa F, Dinis-Oliveira RJ. A fatal case by a suicide kit containing sodium nitrite ordered on the internet. *J Forensic Leg Med*. 2020;73:101989.
- Mack KA, Kaczkowski W, Sumner S, et al. Special report from the CDC: suicide rates, sodium nitrite-related suicides, and online content, United States. *J Saf Res*. 2024;89:361–368.
- Yoon JC, Kim SE. Suicide attempt using sodium nitrite ordered on the internet: two case reports. *Medicine (Baltimore)*. 2022;101(28):e29355.
- McCarthy v. Amazon.com, 23-cv-1019 (W.D. Wash. Sep. 7, 2023).
- Yip PS, Caine E, Yousuf S, et al. Means restriction for suicide prevention. *Lancet*. 2012;379(9834):2393–2399.
- Text - H.R.4310 - 118th Congress (2023-2024): Youth Poisoning Protection Act (2023). <https://www.congress.gov/bill/118th-congress/house-bill/4310/text>
- Text – S.B.S582 – 2023-2024 Legislative Session: An act to amend the general business law, in relation to prohibiting the sale of sodium nitrate and sodium nitrite to any person under the age of twenty-one. 2023. <https://www.nysenate.gov/legislation/bills/2023/S582>
- Text – AB-1109 – 2023-2024 Legislative Session: An act to add Chapter 10.5 (commencing with Section 108930) to Part 3 of Division 104 of the Health and Safety Code, relating to health and safety. 2023. https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB1109
- Bloom J, Sharpe A, Nulman S, et al. Comparing confirmed sodium nitrite suicide deaths with poison center surveillance estimates. *JAMA Netw Open*. 2024;7(9):e2434192.
- Wolkin AF, Martin CA, Law RK, et al. Using poison center data for national public health surveillance for chemical and poison exposure and associated illness. *Ann Emerg Med*. 2012;59(1):56–61.

Article Information

Published Online: January 22, 2025.
<https://doi.org/10.4088/JCP.24br15678>

© 2025 Physicians Postgraduate Press, Inc.
J Clin Psychiatry 2025;86(1):24br15678

Submitted: October 23, 2024; accepted November 18, 2024.

To Cite: Mudan A, Lebin JA. Suicides by sodium nitrite reported to America's Poison Centers: 2020–2023. *J Clin Psychiatry*. 2025;86(1):24br15678.

Author Affiliations: Department of Emergency Medicine, Rutgers Health New Jersey Medical School, Newark, New Jersey (Mudan); New Jersey Poison Information and Education System, Newark, New Jersey (Mudan); Department of Emergency Medicine, University of Colorado School of Medicine, Aurora, Colorado (Lebin); Rocky Mountain Poison & Drug Safety, Aurora, Colorado (Lebin).

Corresponding Author: Anita Mudan, MD, 185 South Orange Ave, MSB E-609, Newark, NJ 07103 (am4220@njms.rutgers.edu).

Relevant Financial Relationships: The authors report no financial or other relationship relevant to the subject of this report.

Funding/Support: None.

Previous Presentation: Poster presented at the American College of Medical Toxicology Annual Scientific Meeting; April 12, 2024; Washington, DC.

ORCID: Jacob A. Lebin:
<https://orcid.org/0000-0003-1553-3363>

Scan Now



**Cite and Share
this article at
Psychiatrist.com**