

# INCREASED PREVALENCE OF SODIUM NITRITE SUICIDES IN SOUTH AUSTRALIA

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## Background

- Sodium nitrite (NaNO<sub>2</sub>) is a water-soluble, white-yellow coloured crystalline powder with broad industrial applications<sup>1</sup>.
- In Australia, it has also been used to humanely control growth of feral pig populations<sup>2</sup>.
- While several cases of accidental consumption have been reported in the literature, sodium nitrite has recently emerged as an increasingly popular method of pharmacological suicide.
- This method has been recommended in The Peaceful Pill Handbook<sup>3</sup> with additional information and “suicide kits” available online.
- After oral ingestion, sodium nitrite interferes with the ability of red blood cells to carry oxygen, causing subsequent hypoxia and lactic acidosis<sup>1</sup>.



### Hypothesis:

- Sodium nitrite suicides have rapidly increased in recent years.

### Aim:

- Evaluate trends in sodium nitrite suicides in the South Australian autopsy population from 2000-2019
- Provide an overview of demographics, medical history, access, autopsy and toxicology findings.

## Methods

### Case Identification

- Cases of intentional sodium nitrite ingestion were identified from records at Forensic Science South Australia (FSSA) and the National Coronial Information System (NCIS)
- Recorded variables: date of death, age, sex, manner of death, medical history, scene findings

### Statistical analysis

- Performed using R (version 1.2.1335)<sup>4</sup>
- Quasi-Poisson regression characterised trend in time series

### Ethical approval

- University of Adelaide Human Research Ethics Committee (H-2020-033)
- Justice Human Research Ethics Committee (M0472)

## Results

### Prevalence

- Between 2000 and 2019, 10 cases of intentional sodium nitrite ingestion were identified from FSSA and NCIS records
- All 10 cases occurred in the latter 3 years of the study period

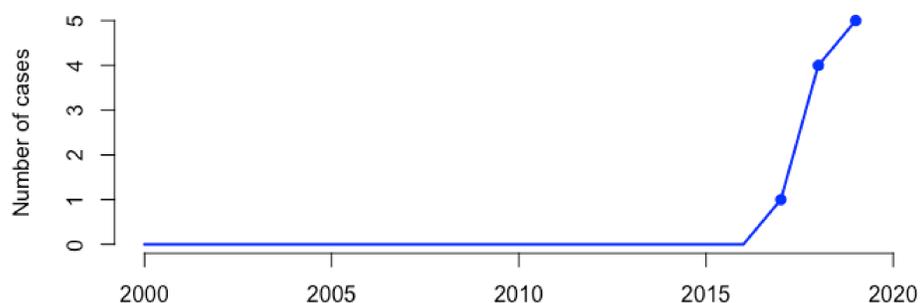


Figure 1: Significant increase in sodium nitrite suicides in South Australia between 2000-2019 ( $p > .001$ )

Data presented as number of cases over time. A quasi-Poisson model determined significant rate change.  
Frequency of Deaths  $\approx e^{-1.979 + 0.98 \times \text{Year}}$

### Demographics

Age Category	Sex				Total	
	Male		Female		Total	
	No.	%	No.	%	No.	%
Young Person (15-24 years)	1	10	1	10	2	20
Adult (25-64 years)	4	40	1	10	5	50
Elderly (65+ years)	3	30	0	0	3	30
<b>Total</b>	<b>8</b>	<b>80</b>	<b>2</b>	<b>20</b>	<b>10</b>	<b>100</b>

Table 1: Demographic characteristics of sodium nitrite suicides

Data presented as number (%) of cases.

- Large proportion of decedents were adult and elderly males (70%)

## Results (Cont.)

### Medical History

- 7 decedents had a history of depression and/or expressed suicidal ideation
  - 3 had a previous suicide attempt
- 1 case with a complex chronic medical history
- 2 cases with unknown medical history

### Source of Sodium Nitrite

- Food-grade sodium nitrite was sourced from Back 2 Basics Homebrew Supplies in 2 cases
- In 1 case, a sodium nitrite suicide kit was sourced via the post
- The source of sodium nitrite in the remaining cases was unknown

### Autopsy Findings

- Consistent with post-mortem signs of methemoglobinemia:
  - Blue-grey hypostasis
  - Dark brown discolouration of blood and internal organs



Figure 2: Blue/cyanotic hypostasis



Figure 3: Red/brown leptomeninges



Figure 4: Post-mortem blood

### Toxicology Findings

- FSSA does not have a validated analytical method for nitrite in body fluids or quantification of methaemoglobin
- Samples submitted to external laboratory for analysis
  - 1 case returned a result of 87.5% methaemoglobin
  - The post-mortem blood sample was unsuitable for analysis or outside the analytical range in the remaining cases
- Methaemoglobin interferes with FSSA analytical methods for carboxyhaemoglobin (COHb)
  - Several cases returned high false-positive results for COHb
- However, most cases also returned a positive nitrite result on a urinalysis dipstick for urine and/or gastric contents



Figure 5: Positive nitrite in the vitreous using a urinalysis dipstick

## Conclusions

- Sodium nitrite suicides have increased rapidly over the last 3 years
  - It has many favourable properties as a pharmacological suicide agent; it is cheap, widely available and easy to use
- Current study demonstrates substance-use patterns recommended by pro-euthanasia publications (e.g. The Peaceful Pill Handbook)
- Most prevalent among adult and elderly males with a history of depression and/or chronic illness
- Autopsy and toxicology findings consistent with previous studies

## References

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## Acknowledgements

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