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Recreational use of Nitrous Oxide

TOM ADDEY, PUBLIC HEALTH REGISTRAR

DALIA YOUSSEF, PUBLIC HEALTH REGISTRAR

With thanks for contributions from: Helen Walcott, Deborah Redknapp, Jillian Hunt, Sian Smith, Jason Mahoney, Anna Richards

Purpose

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This document describes the health harms associated with recreational use of nitrous oxide and policy context

Contents:

1. Background and prevalence
2. Health harms
3. Emerging public health issue: admissions for nitrous oxide induced myelopathy at a local hospital
4. Why now? Window of opportunity for action
5. Avoiding unintended consequences

Appendices:

- National and local interventions and policy levers to tackle NOS
- Principles and examples of effective harm reduction advice
- Regulatory and licensing actions
- Areas of further research

Background and prevalence

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- Nitrous Oxide, commonly known as laughing gas, hippy crack or NOS, is a colourless gas sold in canisters.
- NOS is inhaled recreationally usually from balloons. The effects last 30-60 seconds and users may feel euphoric, relaxed, and have mild perceptual changes.
- NOS is typically used socially in parks, cars (car parties), house parties, nightclubs and festivals.
- More recently much larger canisters available to buy (600g+), and social media has played a greater role in advertising, sales and promotion of NOS
- Nationally in 2019/20, 8.7% of 16 to 24-year-olds reported use of nitrous oxide.[1] After cannabis, it is the second most popular controlled substance.[2]
- Data from the OxWell Student Survey 2021 found that among the 127 respondents aged 12-18 year in Berkshire East who reported any form of drug use, 23 had ever used NOS.
- Use among males is higher than females[3]
- Most users consume occasionally and in small quantities[3]
- Perception among users of being safe[3]

8g 'whippets'

Much larger 580g cylinder

[1] ONS Drug misuse in England and Wales: year ending March 2020
[2] ONS Drug misuse in England and Wales: year ending June 2022
[3] Recreational use of nitrous oxide: a growing concern for Europe

National Policy timeline

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2014
Home Office guidance on restricting the supply of NOS for recreational use (link)

2015
Advisory Council on the Misuse of Drugs (ACMD) letter to the Home Secretary on nitrous oxide abuse (link)

2016
Nitrous oxide is covered by the Psychoactive Substances Act (PSA) (link) and is illegal to give away or supply for its psychoactive effect

2018
PSA reviewed by the Home Office and concluded the use of nitrous oxide does not appear to be impacted by the act

2021
Home Secretary request to ACMD for updated assessment of the health and social harms of NOS and to advise if it should be controlled under the Misuse of Drugs Act 1971

2023
Advisory Council on Misuse of Drugs (ACMD) public call for evidence Feb 2023. Updated harms assessment published Mar 2023 (link)

Health harms

Occasional use is considered less harmful than for many other types of recreational substances. Health risk associated with NOS are rare but can include:

- Cold burns to lips, throat and exposed skin, and lung injuries due to high pressure (when inhaled directly from canisters).
- Fainting, loss of consciousness or suffocation (particularly when used in confined spaces such as car, face mask or bag over head)
- Road traffic accidents – nitrous oxide can cause significant impairment and it is not safe to drive after using
- Nerve damage (neuropathy / myelopathy) causing muscle weakness, loss of balance, difficulty walking, urinary incontinence or retention, sexual dysfunction and in rare cases paraplegia (loss of movement in legs)
- Although rare, NOS use can be fatal – e.g. suffocation from inhaling with bag over head

Frostbite injury from inhaling NOS from canister BMJ 2021

Damage to spinal cord on MRI Radiopaedia.org

[1]Drug misuse: findings from the 2018 to 2019 CSEW (publishing.service.gov.uk)

Emerging local issue: NOS Myelopathy

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- The neurology team at a hospital in Berkshire East have reported a recent increase in cases of Nitrous Oxide Myelopathy (nerve damage; a known but serious complication association with high NOS exposure). Although numbers of identified cases remain small (< 20 per annum) this has increased over recent years, and therefore requires ongoing surveillance.
- Cases are predominately in males aged under 25 area with a history of recreational NOS use

About Nitrous Oxide Induced Myelopathy[1]:

- NOS causes dose-dependent neurotoxicity, with regular and heavy use posing the greatest risk, although it has been observed following isolated or low-dose exposures in some people.
- The mechanism for this is thought to involve inactivation of vitamin B12 causing nerve damage
- Vitamin B12 cannot be made by our body and must come from diet. The main sources include meat, fish and diary.
- Those with low levels of vitamin B12 (for dietary reasons or otherwise) are more susceptible to complications of NOS
- Treatment involves stopping NOS use, supplementation with B12 and therapy. If NOS is not stopped, vitamin B12 supplementation may not prevent further damage
- Usually the damage is at least partially reversible if treated early, but for some individuals the effects may be permanent
- Data from the Global Drug Survey found that 3.3% of people who had used NOS in the past 12 months reported persistent numbness/tingling (paraesthesia) in their hands or feet and there was a strong dose-response relationship observed[2].

[1] Recreational use of nitrous oxide – a growing concern for Europe (europa.eu)
[2] Nitrous oxide causes peripheral neuropathy in a dose dependent manner among recreational users

New clinical guidelines released in February 2023

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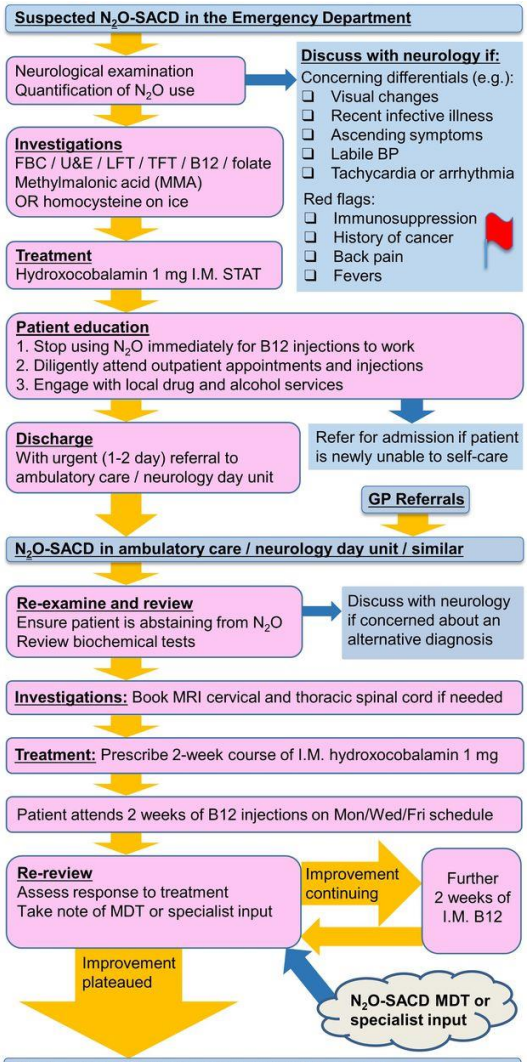
- The Royal London Hospital (East London) diagnose and treat one case of nitrous oxide induced myelopathy every 9 days[1].
- In response to the increasing number of cases, they have worked with neurologists and experts across the UK to develop and publish guidance on the identification and management of nitrous-oxide induced myelopathy.
- The full Association of British Neurologist Clinical guideline is available here[2]

Principles of management [1]:

- Recognition, comprehensive assessment and early treatment is critical
- Management involves stopping NOS, a course of B12 injections and input from physio and occupational therapy teams as required.
- Ambulate patients can be managed as outpatients but risk of adherence and follow-up attendance needs to be considered
- In areas with a large number of cases, an MDT should be adopted
- Accurate and consistent clinical coding is important for surveillance and auditing – SNOMED codes included in guidance
- Continued use of NOS may lead to worsening and irreversible damage despite treatment
- Referral to local drug and alcohol service to aid abstinence should be considered.



Pathway for patients with suspected N_2O-SACD[1]

[1] Nitrous oxide-induced subacute combined degeneration of the cord: diagnosis and treatment | Practical Neurology (bmj.com) [2] ABN Guidelines (theabn.org)

Findings from ACMD review
Published 6th March 2023

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Advisory Council on the Misuse of Drugs harms assessment of nitrous oxide

Key findings:

- NOS remains widely used particularly by young people
- There have been reports of an increase in neurological harms, including nerve and spinal cord damage relating to heavy use, which may be linked to availability of larger canisters
- Additional measures are needed to reduce the health and social harms of NOS, but these should be evidence based and proportionate
- The ACMD have made 7 **recommendations** across the following areas:

1. **Legislation** - Current evidence suggests that the health and social harms of nitrous oxide are not commensurate with control under the Misuse of Drugs Act 1971.
2. **Non-legitimate supply** – additional restrictions on sales
3. **Reducing health harms** (see box to the right)
4. **Reducing social harms** – additional police powers to confiscate
5. **Monitoring health and social harms** – improved surveillance of harms
6. **Legitimate uses** – to be considered
7. **Impact review**

ACMD recommendations to reduce health harms:

- **Universal prevention activity for the public, young people and schools**
- **Information and advice for the public in places where NOS is more common e.g. festivals**
- **Updated information for healthcare staff and other organisations who come into contact with people who use nitrous oxide**
- **local authority public health teams should work with others to ensure that drug treatment services have the necessary information and resources to support individuals experiencing problems with nitrous oxide**

Publication of ACMD's review on nitrous oxide - GOV.UK (www.gov.uk)

Why now? Window of opportunity for action

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Nitrous oxide is not a new issue, however the current context may provide the opportunity for further action to reduce the risks associated with NOS use:

Sociological:

- Changes to how NOS is sold and consumed, and emerging evidence of increase health effects locally

Political:

- High prevalence and visible issue in the community (concerns around antisocial behaviour, crime and littering)
- Focus from central government / Home Office

Environmental:

- Nitrous oxide is 300x more potent than CO_2 and major cause of greenhouse gases (mainly linked to legitimate use in farming)
- Nitrous oxide alone legitimately used in medical gasses contributes 2% of the total NHS England carbon footprint, and 75% of the total anaesthetic gas footprint[1]
- Concerns about occupational exposure among hospital staff to Entonox (gas and air)[2]

Legal:

- ACMD Nitrous Oxide public call for evidence and updated advice

Examples of what types of action may be taken are described in appendix 1 and appendix 3.

[1] The Nitrous Oxide Project | Centre for Sustainable Healthcare
[2] Supporting hospitals in exposure to nitrous oxide (iom-world.org)

Avoiding unintended consequences

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Any intervention, policy or regulatory action can have unintended consequences. A number of these should be noted:

- Risk of stigmatising particularly communities through identifying them as a particular risk group or through targeted messaging
- Universal communications campaigns may normalise use and increase prevalence see appendix 2 for further guidance on communications/
- Majority of recreational use is from 8-gram cartridges typically associated with low levels of use and limited harms. Restricting availability of these may cause a switch to larger volume cylinders, risk of substitution to other more harmful drugs (e.g. spray paints)
- Further regulation (e.g. criminalising use) may lead to increased involvement of criminal organisations, and illicit production which carries higher risk (explosion and contamination) or deter those who experience health harms from seeking support or help.
- Need to consider widespread legitimate uses of the gas by industry, healthcare and consumers (currently with few alternatives to its use) and engagement needed with these stakeholders

Appendix 1: Harm reduction strategies

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- Monitoring and surveillance to better understand the problem and the risks. This includes studying prevalence in the general population, at-risk groups, and the markets
- Formal risk assessments
- Early warming systems
- Targeted communication campaigns using simple, evidence based harm-reduction advice (see appendix 2)
- Increased awareness among drugs and alcohol services offering support for high risk users
- Regulatory action (see appendix 3)
- Legal action (e.g. criminalising possession)

Hospital emergency departments, specialist neurology and burns centres, and the police all play a key role in identifying, monitoring and responding to the increase in harms caused by nitrous oxide — as do outreach and street-work agencies, and drug prevention and harm reduction services.

Appendix 2: Evidence based harm reduction

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- The vast majority of people do not use NOS– it is important to avoid normalising and unintentionally promoting its use
- Targeted and environment based interventions should be considered rather than general information or warning campaigns
- Targeted health promotion, including risk communication, should provide timely, clear, credible and consistent evidence-based messages that raise awareness and understanding and offer practical actions that can be taken. This may include communication with users as well as parents and guardians, and should come from trusted sources. Existing resources typically:
  - Explain what the gas is, how it is used, its effects and unwanted adverse effects and other risks
  - Explain why inhaling from a balloon, rather than a cartridge or cannister, reduces the risks of burns, lung injuries and asphyxiation
  - Advise that people sit in a safe environment before inhaling the gas, as this helps prevent injuries from falls caused by fainting or loss of coordination and balance
  - Highlight dangers of driving following use
  - Highlight dangers of using other drugs e.g. alcohol at the same time
  - Explain the need to urgent medical care following burns
  - Highlight risks of chronic toxicity and messages on identifying the early signs of nerve damage and the need to obtain medical care as soon as possible
  - Advice on what to do in an emergency
  - Direct people to further information, treatment and services

Recreational use of nitrous oxide – a growing concern for Europe (europa.eu)

Appendix 3: Examples of regulatory actions

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- Restricting the maximum quantity of cartridge that can be supplied at any one time
- Age restricted sales
- Restricting sales at night
- Preventing nitrous oxide products being visible in shops
- Prohibiting sales in bars, clubs or in shops selling alcohol and tobacco
- Warning labels on products
- Requiring sellers to keep records of sales to verify sales are legal
- Prohibiting sales of crackers and balloons when intended to be used with nitrous
- Strengthening legislation around safe transport and storage of nitrous oxide

- Prohibiting the sale for recreational in the UK was not associated with a measurable decline in prevalence[1, 2]

[1] Review of the Psychoactive Substances Act 2016 - GOV.UK (www.gov.uk)
Recreational use of nitrous oxide – a growing concern for Europe (europa.eu)

Appendix 4: Areas of further research

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The following questions came up during the review that would benefit from further research:

1. Has the way in which NOS is being used recreationally changed locally and is this contributing to an increase in adverse health effects and hospital admissions?
2. Is the use of NOS more common in particular groups? E.g. specific age and ethnicity groups
3. Is there a link between ethnicity and increased risk of susceptibility to health complications associated with NOS use?
4. How might changes to national policies and legislation impact the risks associated with recreational NOS use?