

Nitrous Oxide

Nitrous oxide (N₂O) is a colorless, odorless, non-flammable gas¹ commonly known as laughing gas or nitrous in mainstream culture, but known as Whip-Its or Noz[z] among illicit users. Whip-Its are containers filled with nitrous oxide and commonly found in head shops. Nitrous oxide is manufactured for various purposes, including:

Medical anesthetics: Nitrous oxide is used in the production of medical grade inhalation anesthetics – combined with oxygen gas – as a common practice in dentistry for providing minimal and moderate sedation for patients².

Aerosol propellant: Nitrous oxide is used as a whipping propellant for food grade aerosols, including whipped cream canisters, cooking sprays, and other similar aerosols. In whipped cream canisters, nitrous oxide dissolves in the liquid (fat of the cream) and as the cream is released from the can the gas expands creating the whipped cream texture³.

Internal combustion engine: Nitrous oxide is used in auto racing to allow an engine to burn less fuel by providing more oxygen than air alone, resulting in a powerful combustion³.

Nitrous oxide has the potential for misuse and abuse. It is commonly used as an inhalant to produce a narcotic effect, acting as a dissociative drug causing a sense of euphoria and both visual and auditory hallucinations⁴. Unlike medical grade nitrous oxide, nitrous oxide used illicitly (i.e., whip-its) is not combined with oxygen, resulting in higher concentrations of pure nitrous oxide. Inhalation of high concentrations of nitrous oxide deprives the body of oxygen. Depriving the brain of oxygen can cause nerve damage, unconsciousness, and even death. The euphoric effects of nitrous oxide last only a few minutes and individuals often use repeatedly to sustain the high over several hours.

Data on the misuse of nitrous oxide specifically is not regularly available, but is generally included as part of data on all inhalant use.

Data about inhalant use includes solvents, aerosols, gases, and nitrites.

Although inhalant disorders are among the least prevalent substance use disorders, more than 22.8 million people have tried inhalants in their lifetime, and 8% of those were children between the ages of 12 and 17⁵.

Children between the ages of 12 to 15 generally inhale fumes from gasoline, spray paint, glue, and shoe polish while new users between the ages of 16 and 17 favor nitrous oxide. According to the 2016 Missouri Student Survey Report, 2.7% of 6th through 12th grade St. Louis County students had used inhalants in their lifetime, compared with 2.8% in Missouri and 9.10% of all United States students 12 to 17 years of age in 2015. For age of first use by St. Louis County students, inhalants were used earlier (age 10.87) than other drugs (cigarettes, age 13.22; alcohol, age 13.54), and marijuana was used latest

Short term effects²⁰

- dizziness
- euphoria or feelings of excitement
- loss of body coordination

Long term effects

- frost bite
- nerve damage
- brain damage from oxygen deprivation
- cardiac arrest

(age 14.37)⁶. Inhalant use in the previous year among adolescents aged 12 to 17 in the United States, Missouri, and St. Louis County has been decreasing since 2002. The rate of inhalant use in 2012 was significantly lower than the rate for every year of the National Survey on Drug Use and Health between 2002 and 2011. The 2012 rate among males was significantly lower than 2011 (2.1% versus 3.1%). The 2012 rate among white adolescents was significantly lower than the 2011 rate (2.5% versus 3.0%). By race/ethnicity, the rate of inhalant use ranged from 1.3% (Asians) to 4.8% (American Indian/Alaska Native) in 2012.

Legal and Regulatory Authority

Nitrous oxide is regulated by the Food and Drug Administration (FDA) as a “designated medical gas” under section 575 of the Food, Drug, and Cosmetic Act (FD&C Act). The marketing, distribution, or sale of medical nitrous oxide for human or animal use requires a distribution certification which is issued by the FDA upon application. The marketing, distribution, or sale of nitrous oxide for industrial applications (such as calibration gases) does not require a distribution certification.

Federal law has not classified nitrous oxide as a controlled substance therefore it is not regulated by the Drug Enforcement Agency (DEA). In the absence of federal regulations for non-medical use/distribution of nitrous oxide, numerous states have passed legislation regulating the possession, sale, and distribution of nitrous oxide⁷. Enacted legislation includes:

Limit on quantity- intended to setting an upper limit for the amount of nitrous oxide that may be sold without special license (e.g., for use by a licensed medical or dental practitioner; for use as part of a manufacturing process or industrial operation; and for use as a propellant for food preparation)^{8,9,10}, and

Possession, distribution or delivery – prohibits sale, transfer of possession, or distribution to a minor⁷, and

Prohibition of inhalable compounds – prohibits inhalation of toxic vapors for intoxication effect.

Approximately thirty-eight states have enacted statutes concerning inhalants⁷. Most states specifically focus on the use of or intention to use toxic vapors or inhalable compounds for the purpose of inducing a condition of intoxication, inebriation, and excitement by inhalation^{11,12,18}. Violation is most often a misdemeanor¹³ though in some states violation is considered a felony¹⁴, with penalties ranging from small fines to jail time⁷. Most state laws are very broad in scope to encompass as many inhalants as possible¹⁵. Some are specific, such as Oregon, whose law defines “inhalant” as any “substance that is capable of causing intoxication and that contains one or more of...” then lists twenty-three chemical compounds along with a catch-all phrase that includes “any other solvent, material, substance, chemical or combination thereof having

States with inhalant statutes:

Arizona, California, Colorado, Connecticut, Georgia, Florida, Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, New Mexico, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, New Hampshire, New Jersey, Nevada, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont and Virginia.

States with fines and/or jail time

provisions include: Arizona, California, Georgia, Idaho, Iowa, Louisiana, New Mexico, Maryland, Massachusetts and Texas

the property of releasing toxic vapors of fumes¹⁶.” Missouri, similar to federal law, does not recognize nitrous oxide as a controlled substance and therefore it is not regulated at the state level.

Recommendations

Based on scientific literature and best practices, Saint Louis County Department of Public Health (DPH) recommends the following interventions to decrease inhalant use.

Encourage Medical Provider Screening: Inhalants are often the first drug youths use because they are highly accessible, cheap, and easy to hide^{17, 8}.

***Recommendations:** DPH should encourage pediatric medical providers to screen for inhalant substance use among adolescents and provide education on the harms of misuse and abuse.*

Encourage Comprehensive Substance Use Curriculum: Ensure substance use prevention curriculum and education addresses inhalant use.

***Recommendations:** DPH should collaborate with partners to ensure curriculum addresses inhalant substance use among adolescents and provide education on the harms of misuse and abuse.*

Provide Educational Fact Sheets: DPH has the capacity and expertise to develop community-relevant materials for targeted prevention audiences. Target prevention audiences should include adolescents, parents and caregivers, medical professionals, and school-based staff.

Inhalant abuse can be hard to detect because inhalants are easily hidden and their effects are short-lived⁸. Inhalant abuse should be suspected when a cache of a potential inhalant is discovered or when products with abuse potential are found stored in unusual locations¹⁹. Some common signs of inhalant abuse include^{7,8}:

- Red or runny eyes or nose
- Chemical or unusual smelling breath
- Paint or stains on clothing or face
- Loss of appetite, nausea
- Drunk, dazed or dizzy appearance
- Anxiety, irritability
- Sores or spots around mouth

There are also behavioral changes that may accompany inhalant abuse, such as: worsening grades, poor hygiene, weight loss, fatigue, confusion, poor concentration, depression, irritability, hostility, or paranoia¹⁹.

***Recommendations:** DPH should draft educational health materials by age groups and common morbidity/mortality outcomes.*

Community Resources

The following is an abbreviated list of substance use education and treatment resources in Saint Louis County:

Saint Louis County DPH

<http://www.stlouisco.com>

John C. Murphy Health Center

(Berkeley Location)

6121 North Hanley Road

Berkeley, MO 63134

(314) 615-0500

North Central Community Health Center

(Pine Lawn Location)

4000 Jennings Station Road

Pine Lawn, MO 63121

(314) 679-7800

South County Health Center

(Sunset Hills Location)

4580 South Lindbergh Blvd

Sunset Hills, MO 63127

(314) 615-0400

NCADA

9355 Olive Blvd

Saint Louis, MO 63132

(314) 962-3456

<http://ncada-stl.org>

Behavioral Health Response (BHR)

12647 Olive Blvd Ste 200

Creve Coeur, MO 63141

(314) 469-4908

www.bhrstl.org

National Alliance on Mental Illness (NAMI)

1750 S. Brentwood, Ste 511

St. Louis, MO 63144

(314) 962-4670

www.namistl.org

Great Circle

330 N Gore Ave

St. Louis, MO 63119

(314) 968-2060

www.greatcircle.org

Every Child's Hope

8240 St. Charles Rock Road

St. Louis, MO 63114

(314) 427-3755

www.everychildshope.org

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