

Inhalant Use Disorder

DSM-5-TR 304.60/305.90 | ICD-10-CM F18.10, F18.20

Repeated intoxication with volatile hydrocarbons, concentrated in young adolescents and carrying real risk of sudden sniffing death.

12-MONTH PREVALENCE
~0.4% (US ages 12-17)

TYPICAL ONSET
Ages 12-17; peaks early teens

SEX RATIO
Roughly equal in teens

COURSE
Usually remits by early 20s

CLINICAL PICTURE

- Intoxication begins within seconds and lasts 15 to 45 minutes, prompting repeated dosing across hours to sustain the effect.
- Glue sniffer's rash around the mouth and nose, chemical odor on breath and clothing, and paint or solvent staining of the hands are visible clues.
- The picture resembles alcohol intoxication with slurred speech, ataxia, nystagmus, and euphoria, but clears far more quickly afterward.
- Products are cheap and legal: toluene-based glues, spray paint, butane refills, computer duster, correction fluid, and nitrous oxide chargers.
- Use concentrates in younger adolescents and in socioeconomically marginalized or remote communities, and usually occurs in group settings.
- Chronic use brings cognitive dulling, cerebellar ataxia, peripheral neuropathy, and school failure that can persist long after abstinence.

DIAGNOSTIC CRITERIA AT A GLANCE

- Requires at least 2 of 11 problematic use indicators within 12 months, applied specifically to a hydrocarbon-based inhalant substance.
- Withdrawal is not part of the inhalant criterion set, since no reliable inhalant withdrawal syndrome has been established.
- Nitrous oxide and the volatile nitrites are coded under other or unknown substance use disorder rather than as inhalant use disorder.
- Severity is graded mild 2-3, moderate 4-5, and severe 6 or more, with remission specifiers and a controlled environment specifier.
- The specific inhalant should be named when known, since toxicity differs sharply between toluene, butane, and halogenated solvents.

NEUROBIOLOGY & PHYSIOLOGY

- Volatile solvents are highly lipid-soluble and reach the CNS within seconds, potentiating **GABA-A** and glycine receptors while blocking **NMDA**.
- Toluene increases mesolimbic **dopamine** firing in the ventral tegmental area, producing reinforcement broadly similar to that of alcohol.
- Sudden sniffing death arises from myocardial sensitization to catecholamines, causing fatal arrhythmia when a startled user exerts or is chased.
- Chronic toluene exposure produces white matter demyelination with diffuse leukoencephalopathy, cerebellar atrophy, and corpus callosum thinning.
- Systemic toxicity includes distal renal tubular acidosis, hepatotoxicity, benzene-related aplastic anemia, and nitrite-induced methemoglobinemia.
- Nitrous oxide inactivates **vitamin B12**, producing subacute combined degeneration with dorsal column signs and megaloblastic changes.

PSYCHOLOGICAL MECHANISMS

- Accessibility and cost drive initiation, since inhalants are often the first intoxicant available to children too young to obtain alcohol.
- Peer modeling within group sniffing sessions supplies both social reinforcement and direct instruction in technique and product selection.
- Escape from abuse, neglect, hunger, and community trauma is a dominant motive, making the behavior powerfully negatively reinforced.
- Users routinely underestimate lethality because the products are ordinary legal household items rather than recognized street drugs.
- Externalizing traits, conduct problems, and early school disengagement predict both initiation and progression to other substances.

DIFFERENTIAL & COMORBIDITY

- Differentiate from alcohol intoxication by the chemical odor, the perioral rash, and the far shorter duration of measurable impairment.
- Exclude head injury, hypoglycemia, a postictal state, and CNS infection in any adolescent presenting with acute confusion and ataxia.
- Comorbidity is very high: conduct disorder, ADHD, depression, PTSD, and later alcohol, cannabis, and opioid use disorders.
- Suicide attempts and antisocial behavior are markedly elevated in adolescent inhalant users compared with other adolescent substance users.
- Check a metabolic panel for anion gap acidosis and hypokalemia, plus CBC, LFTs, creatinine, and B12 when nitrous oxide is involved.

Treatment EVIDENCE-BASED MANAGEMENT

PHARMACOLOGIC

- No pharmacotherapy is approved or established; treatment is psychosocial, with medication reserved for comorbid psychiatric conditions.
- Acute intoxication requires cardiac monitoring and a deliberately calm approach, since catecholamine surges can precipitate fatal arrhythmia.
- Avoid **epinephrine** in solvent-related arrhythmia where alternatives exist; beta blockade has been used for the sensitized myocardium.
- Treat nitrous oxide neuropathy with high-dose **vitamin B12** replacement, following methylmalonic acid and homocysteine to gauge response.
- Treat comorbid ADHD, depression, and anxiety, since untreated symptoms sustain use and undermine treatment engagement.

PSYCHOTHERAPY

- CBT** and **motivational enhancement therapy** adapted for adolescents form the core, delivered with cognitively simplified language.
- Multisystemic therapy** and **multidimensional family therapy** address the family and community context that sustains the use.
- Contingency management** with tangible reinforcers improves attendance and abstinence across adolescent substance treatment programs.
- Cognitive impairment often requires slower pacing, repetition, visual aids, and shorter sessions than standard manuals assume.
- School reintegration and vocational engagement supply competing reinforcement in communities with few alternative activities.

ADJUNCT & SUPPORTIVE

- Community-level supply restriction, product reformulation, and retailer education reduce access more effectively than individual counseling.
- Neuropsychological testing documents deficits and guides realistic educational and vocational planning once abstinence is established.
- Assess housing, food security, child protection, and caregiver substance use, since inhalant use signals broader family crisis.
- Residential treatment is often necessary, as outpatient care rarely separates the adolescent from the using peer group.
- Involve child protective services when use occurs in a child under 12 or when supervision failures are clearly evident.

- ☆ **CLINICAL PEARLS**
- Sudden sniffing death can occur on a first use; there is no safe exposure level.
 - Nitrous oxide inactivates B12; look for subacute combined degeneration.
 - Perioral rash plus solvent odor in a young teen is inhalant use until disproven.

References

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NOTE

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