

Stimulant Use and Intoxication

A plain-English guide for you and your family

WHAT IS HAPPENING

When someone uses cocaine, methamphetamine (meth), or MDMA (ecstasy or molly), the drug forces the brain to dump huge amounts of dopamine (the chemical that drives reward and movement) and norepinephrine (the chemical that triggers the body's fight-or-flight alarm). Normally these chemicals rise and fall in a smooth rhythm—you feel alert, focused, and ready to act, then the prefrontal cortex (the front part of the brain that pumps the brakes on impulses and strong feelings) steps in to calm things down. But stimulants jam the brake pedal and flood the system all at once. The heart pounds faster and harder, blood vessels squeeze tight so blood pressure shoots up, pupils dilate wide, muscles twitch and burn extra fuel so body temperature climbs, and the thinking brain gets so overloaded it may see things that aren't there (hallucinations) or believe impossible things (delusions). Sweating and shaking are common. Chest pain can mean the heart muscle isn't getting enough oxygen—even in a young person with clean arteries, because the vessels have clamped down. A severe headache or sudden confusion can signal a blood vessel tearing or bleeding inside the brain. Seizures can happen because the brain's electrical system misfires under the chemical storm. If body temperature stays dangerously high (often above 104°F), proteins inside cells start to fall apart and muscles break down, spilling toxins into the blood that clog the kidneys and liver—this is called rhabdomyolysis. The person may feel invincible, paranoid, or enraged, and because the prefrontal cortex is offline they can't talk themselves down or see danger clearly. The biggest risks are heart attack (even in someone in their twenties), aortic dissection (the main artery tears), stroke or brain bleeding (hemorrhage), multi-organ failure from extreme heat, and suicide or violence during the crash that follows when dopamine drops far below normal. Every symptom—the racing heart, the sky-high pressure, the wild thoughts, the burning fever—is the body and brain trying to survive a chemical flood they were never built to handle. Treatment focuses on calming the heart and brain (benzodiazepines like lorazepam are first-line), cooling the body, lowering blood pressure carefully, and watching for the life-threatening complications. Recovery depends on stopping use, but the brain's reward circuits can stay altered for months, making cravings intense and relapse common without support.

What you might feel

- Racing heartbeat (tachycardia)
- High blood pressure (hypertension)
- Wide, large pupils (mydriasis)
- Sweating and feeling too hot
- Restlessness, jitteriness, or agitation
- Chest pain
- Seizure (sudden jerking or loss of awareness)
- Confusion, paranoia, or hallucinations
- Severe headache
- Nausea or vomiting

Call the doctor right away if...

- Chest pain or pressure (may signal heart attack or torn aorta)
- Seizure or uncontrollable shaking
- Severe confusion, hallucinations, or violent agitation
- Temperature above 104°F (40°C) or muscle rigidity (risk of dangerous overheating)
- Sudden worst-ever headache or one-sided weakness (possible stroke or brain bleed)

What the care team will do

- Place patient on continuous cardiac monitor and pulse oximeter; obtain baseline vital signs every 5–15 minutes until stable.
- Obtain IV access and prepare to give benzodiazepines—lorazepam 2–4 mg IV or diazepam 5–10 mg IV—immediately if the patient is agitated, has chest pain, or systolic blood pressure above 180 mmHg.
- Measure core body temperature with a rectal or esophageal thermometer; if above 39°C (102°F), begin active cooling immediately—remove all clothing, apply ice packs to groin, armpits, and neck, and use evaporative cooling with a fan and water mist.
- Start IV normal saline or lactated Ringer's at 200–500 mL per hour; monitor urine output and aim for at least 200–300 mL per hour of clear or pale yellow urine.
- Draw labs immediately: basic metabolic panel (electrolytes, creatinine), creatine kinase (CK), troponin, complete blood count, and urine drug screen; check fingerstick glucose.

- Create a calm, quiet, dimly lit environment; remove unnecessary staff and stimuli; speak in a low, reassuring voice; avoid physical restraints unless the patient is an imminent danger to self or others.
- Perform a 12-lead EKG within 10 minutes if the patient reports any chest pain, shortness of breath, or has a history of heart disease; repeat troponin at 3 hours and 6 hours.
- Assess for signs of stroke or intracranial bleeding (hemorrhage) (brain bleed) every 15–30 minutes: ask the patient to smile, raise both arms, and repeat a simple sentence; check pupil size and reactivity; note any sudden severe headache, vomiting, or one-sided weakness.

Medicines you may be given — and why

Benzodiazepines (lorazepam, diazepam)

Benzodiazepines turn up GABA (the brain's main calming signal) at GABA-A receptors, which are like brake pedals scattered all over the brain. When someone is high on stimulants, their brain is flooded with dopamine and norepinephrine (chemicals that rev everything up). Benzodiazepines do not turn off the dopamine surge, but they do quiet the overheated circuits, especially the ones driving agitation, fast heart rate, high blood pressure, and seizures.

Intravenous fluids (0.9% normal saline or lactated Ringer's)

IV fluids are not a drug but are a core part of treatment. Stimulants make the heart race and the body overheat, which causes sweating and dehydration. They also constrict blood vessels, which can starve the kidneys. If muscles break down (rhabdomyolysis), they release myoglobin (a protein) that can clog the kidney filters like wet sand in a drain. Fluids flush the kidneys, dilute the myoglobin, and keep urine flowing so the kidneys do not shut down.

Antipsychotics (haloperidol, olanzapine, quetiapine) for severe psychosis

Stimulants flood the brain with dopamine, especially in the mesolimbic pathway (the circuit that links motivation and reality testing). Too much dopamine in this pathway can cause psychosis (hallucinations, paranoia, delusions). Antipsychotics block dopamine D2 receptors in that circuit, which quiets the hallucinations and paranoia. They are used ONLY when psychosis is severe and does not calm down with benzodiazepines alone.

External cooling (ice packs, cooling blankets, evaporative cooling) for hyperthermia

Stimulants rev up metabolism and muscle activity, which makes the body produce heat faster than it can get rid of it. They also mess with the hypothalamus (the brain's thermostat), so sweating may not work right. If body temperature climbs above 104°F (40°C), proteins start to

unfold and cells die, especially in the brain, kidneys, and liver. External cooling pulls heat out of the body directly through the skin before organs fail.

Contingency management (behavioral therapy with rewards)

Stimulant use disorder rewires the brain's reward circuit (the nucleus accumbens and ventral tegmental area) so that the drug becomes the strongest reward signal, stronger than food, sleep, or relationships. Contingency management gives immediate, tangible rewards (vouchers, small prizes) every time a urine drug test comes back negative. This taps into the same dopamine reward pathway and trains the brain to link staying clean with a positive payoff.

Where this information comes from

- American College of Emergency Physicians (ACEP) 2023 toxicology guidelines
- SAMHSA Treatment Improvement Protocol (TIP) 33: stimulant use disorder
- American Heart Association scientific statement on cardiovascular complications of cocaine and methamphetamine
- UpToDate clinical review on sympathomimetic toxicity

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