

# Researchers studying use of nitrous oxide for patients hospitalized for suicide risk

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Researchers at Washington University School of Medicine in St. Louis are studying the use of nitrous oxide—laughing gas—as a treatment for patients who are hospitalized due to suicidal thoughts. They are investigating using the gas as a possible treatment to speed up recovery and reduce risk of suicide.

"Suicide attempts and suicidal thinking often stem from an individual's belief that there's no way out of a situation other than ending one's life," said Charles R. Conway, MD, a professor of psychiatry and one of the study's main investigators. "We think nitrous [oxide](#) might help [patients](#) break out of that mindset and realize they do have options."

Conway and Peter Nagele, MD, an associate professor of anesthesiology and of genetics, have been studying laughing gas—commonly used in dental offices to alleviate pain and anxiety—as a potential treatment for severe depression. About 85 percent of those who attempt suicide are clinically depressed, so the researchers want to evaluate whether the gas may help patients who are at high risk of such attempts.

As many as one-third of patients with clinical depression don't respond to existing drug and psychotherapy treatments, but in an earlier study of 20 people with treatment-resistant depression, Nagele and Conway found that two-thirds of those treated with nitrous oxide experienced improvement in their symptoms.

Most standard [antidepressant drugs](#) affect norepinephrine and serotonin receptors in the brain, but such drugs can take weeks to improve a person's symptoms. Nitrous oxide interacts with a different type of receptor in the brain—NMDA glutamate receptors—and improves symptoms in some patients within hours, Nagel said.

"Nitrous oxide may very quickly improve depression in these patients," said Nagele. "The gas has very few side effects because it leaves the body very quickly once people stop breathing it. However, it appears from our previous research that the antidepressant effects of nitrous oxide may linger in the brain long after the drug is out of the body."

In this new study—funded by a grant from the American Foundation for Suicide Prevention—people who have attempted suicide will breathe a

mixture of oxygen and nitrous oxide for one hour, every other day, for one week.

Half of the anticipated 50 study patients will receive the combination of nitrous oxide and oxygen, along with antidepressant drugs or talk therapy normally prescribed during such a hospitalization. The rest of the patients in the study will receive standard [treatment](#) with antidepressants and psychotherapy, and will receive oxygen without any nitrous oxide for one hour, every other day, for a week.

"We'll do outpatient follow-ups in the weeks after the patients have been discharged to see whether their [suicidal thoughts](#) or depression might be re-emerging," Conway said. "Suicidal thinking often occurs following short-term psychiatric hospitalizations. If such problems re-emerge, the study is designed to provide 'booster' treatments with [nitrous oxide](#), which we believe will continue to lower the likelihood of future suicidal thoughts."

Suicide is one of the top 10 causes of death in the United States and is the 10th leading cause of death in Missouri. Among Missourians ages 10-24, suicide is the second leading cause of death. On average, one person in the state dies by [suicide](#) every eight hours.

Provided by Washington University School of Medicine in St. Louis

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