

Doctors sound alarm about child nicotine poisoning as vapes flood the US market

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Hospital toxicologist Ryan Marino has seen up close the violent reactions of children poisoned by liquid nicotine from electronic cigarettes. One young boy who came to his emergency room experienced intense nausea,

diarrhea, and vomiting, and needed intravenous fluids to treat his dehydration.

Kids can also become dizzy, lose consciousness, and suffer dangerous drops in blood pressure. In the most severe case he's seen, doctors put another boy on a ventilator in the [intensive care unit](#) because he couldn't breathe, said Marino, of Case Western Reserve University School of Medicine.

Thousands of kids a year are exposed to the liquid nicotine in e-cigarettes, also known as vapes. For a toddler, even a few drops can be fatal.

Cases of vaping-related nicotine exposure reported to poison centers hit an all-time high in 2022—despite a 2016 law, the Child Nicotine Poisoning Prevention Act, that requires child-resistant packaging on bottles of vaping liquid. In what doctors call a major oversight, the law doesn't require protective packaging on devices themselves.

Refillable vapes are designed to hold liquid nicotine in a central reservoir, making them dangerous to kids, Marino said. Even vapes that appear more child-resistant—because their nicotine is sealed inside a removable cartridge—present a risk, because the cartridges can be pried open. And some disposable e-cigarettes, now the top-selling type on the market, allow users to take thousands of "puffs" and contain as much nicotine as multiple packs of cigarettes.

Many e-cigarettes and liquids seem designed to appeal to kids, with pastel packages, names such as "Candy King," and flavors such as bubble gum and blue raspberry. That makes vapes far more tempting—and hazardous—than traditional cigarettes, which have lower doses of nicotine and a bitter taste that often prompts children to quickly spit them out, said Diane Calello, the executive and medical director of the

New Jersey Poison Information and Education System.

"Nicotine liquid is an accident waiting to happen," Calello said. "It smells good and it's highly concentrated."

Sen. Richard Blumenthal (D-Conn.), who co-sponsored the 2016 legislation, said he would push to expand the childproof packaging requirement to disposable and pod-based e-cigarettes.

"Every day that FDA allows flavored [e-cigarette](#) products to remain on the market is another day that children can be enticed by these dangerous, and sometimes deadly, products," he said.

Although the FDA declined to comment for this article, on Aug. 2 the agency included a special feature about nicotine poisoning in children in its "CTP Connect" newsletter.

The number of reports to poison control centers about e-cigarettes has more than doubled since 2018, according to an FDA analysis. Poison control centers reported more than 7,000 vaping-related exposures in people of all ages from April 1, 2022, to March 31, 2023.

According to the FDA, 43 of those exposures resulted in hospitalization and an additional 582 in other medical treatment. About half of poison center reports had no information about whether patients needed medical care.

Nearly 90% of exposures involved children under 5. Authors of the report say their numbers likely underestimate the problem, given that poison control centers aren't contacted in every case.

A 1-year-old died from vaping-related nicotine poisoning in 2014. The new FDA report also mentions the apparent suicide of an adult via e-

cigarette poisoning.

A spokesperson for the vaping industry said companies take safety seriously.

"All e-liquid bottles manufactured in the United States conform to U.S. law," said April Meyers, the president of the board of directors and CEO of the Smoke-Free Alternatives Trade Association, which represents the vaping industry. "Not only are the caps child-resistant, but the flow of liquid is restricted so that only small amounts can be dispensed."

Yet many vaping products are made outside the U.S., which has recently been flooded with illegal e-cigarettes, mostly from China.

The increasing number of nicotine exposures among kids—especially curious toddlers who put virtually everything they can grab into their mouths—likely reflects the sheer volume of e-cigarette sales, said Natalie Rine, the director of the Central Ohio Poison Center at Nationwide Children's Hospital.

E-cigarette unit sales grew 47% from January 2020 to December 2022, rising from 15.5 million every four weeks to 22.7 million, according to a report published by the Centers for Disease Control and Prevention.

"This isn't something that parents see as a really big risk," Marino said. "But with the popularity of e-cigarettes, the risk isn't going away anytime soon."

One effective strategy to reduce e-cigarette sales has been to ban flavored products. California, Massachusetts, New Jersey, New York, Rhode Island, and Washington, D.C., have banned all flavored e-cigarettes, while Utah and Maryland have banned some flavors. A study showed overall e-cigarette sales dropped 25% to 31% in states after

flavor bans, compared with states that didn't ban them.

Some doctors say the country needs to do more to protect children.

"If the numbers are rising, then the law ain't working," said Carl Baum, a professor of pediatrics and emergency medicine at Yale School of Medicine.

Pediatrician Gary Smith said the lack of child safety requirements for e-cigarette devices is a major problem. Refillable e-cigarettes are relatively easy for kids to open.

Although most poison control center reports don't include brand information, disposable e-cigarettes—including Elfbar, Puff Bar, and Pop Vape—were some of the most common products mentioned in the FDA analysis. Elfbar is now known as EB Design.

Expanding the federal law to include devices would be "an important step," said Smith, president of the Child Injury Prevention Alliance, an Ohio-based advocacy group that works to prevent injuries in children.

In addition, federal officials should limit the nicotine concentration in vape juices to make them less toxic, as well as ban candy-like flavors and colors on packaging, Smith said.

"The public health response should be comprehensive," Smith said.

Kids have been known to pick up a vape and begin puffing, in imitation of their parents, Calello said.

Even if children don't inhale the aerosol, sucking on a vape exposes their skin to nicotine, which can be absorbed into the bloodstream, said Robert Glatter, an assistant professor of emergency medicine at Lenox

Hill Hospital in New York City. Glatter noted that e-cigarette liquids also contain numerous harmful chemicals, including arsenic and lead, which is toxic at any dose; carcinogens such as acetaldehyde and formaldehyde; and benzene, a volatile organic compound found in auto exhaust.

Fortunately, children who inhale nicotine get a much lower dose than those who ingest it, reducing the risk of serious harm, said Marc Auerbach, a professor of pediatric emergency medicine at Yale School of Medicine.

Only about 2% of exposures in the FDA study were recorded as having a moderate or major effect.

That may be because little kids who get into dangerous liquids—from vape juice to household cleaning products or gasoline—usually spill most of it, Baum said. "They often end up wearing it rather than swallowing it," Baum said.

Although Stephen Thornton has seen a lot of children with nicotine exposure, he said, the human body has ways of protecting itself from toxic substances. "Fortunately, when kids do ingest these e-cig [nicotine](#) products, they self-decontaminate. They vomit—a lot—and this keeps the mortality rate very low, but these [kids](#) still often end up in emergency departments due to all the nausea and vomiting," said Thornton, an [emergency medicine](#) physician and medical director of the Kansas Poison Control Center.

The FDA urges parents and guardians of young children to keep e-cigarettes and vaping liquid out of reach and in its original container.

For emergency assistance, call Poison Help at 800-222-1222 to speak with a poison expert, or visit poisonhelp.org for support and resources.

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