

# Researchers study traumatic injuries caused by exploding e-cigarettes

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The dangers of using electronic cigarettes are well known when it comes to the potential for addiction and lung injury, but new research published in the *Journal of Surgical Research* finds another cause for concern when

it comes to e-cigarettes: the potential for the vaping devices to explode during use.

The study, conducted by members of the Western Pediatric Surgery Research Consortium, found that between January 2016 and December 2019, 15 patients at nine children's hospitals sustained traumatic injuries from e-cigarette explosions. Ten of those required hospital admission, three to intensive care units.

Among the Western Pediatric Surgery Research Consortium members who contributed to the research study was Shannon Acker, MD, assistant professor of pediatric surgery at the University of Colorado School of Medicine and a pediatric surgeon at Children's Hospital Colorado.

We spoke with Acker about the study findings and what they mean for [e-cigarette users](#) and their parents.

Q: Is this a problem you see often?

A: There were 15 patients in this study, and I think four or five of them came from Children's Hospital Colorado. It definitely was an injury we were seeing frequently. When we think about e-cigarettes, vaping, and the problems of marketing cigarettes to teenagers, it usually has to do with addiction and [lung injury](#). Whereas we, as trauma surgeons, were seeing these other traumatic injuries. The goal was to educate people that there are other downsides to e-cigarettes as well.

Q: What is it about these devices that causes these injuries to occur?

A: E-cigarettes use a rechargeable lithium-ion battery that vaporizes the liquid nicotine solution. Because e-cigarettes are so popular, they are not highly regulated and the batteries may be of inferior quality and prone to explosion. The e-cigarette is like a pen with an opening on both ends of

it, so the pressure has to go somewhere. When you push the button to heat the liquid, the battery explodes and the pressure comes directly out. So if it's in your hand or near your face, it will cause injury. There was at least one child in the study whose jaw was broken. It can also cause injuries to the eye and burn wounds to the hand—there was one child where it exploded in his hand and caused not only a burn to the skin, but also radial nerve injury. Where you're holding it when the battery explodes will dictate what gets injured.

Q: Do these injuries often require surgery to repair?

A: Six out of the 15 children in the series required an operation. Three of those were [skin grafts](#) due to burn injury to the skin, one of them had a broken mandible that required repair, and one child had a hand injury that had to be repaired. In another case, the device was much closer to the mouth when it exploded, so the patient broke several teeth and required both dental examination and airway examination in the [operating room](#).

Q: I'm sure any kind of trauma like that is going to have [psychological effects](#) as well. Did these teenagers experience anything like that when these injuries happened?

A: We didn't look at that in this study, but we do know that children who suffer traumatic injuries have higher risk of requiring future mental health resources, and I think these children fall into that category. To have something explode on your face when you're out with your friends is going to leave some lasting effect.

Q: Can you speak to how bad the vaping situation has gotten and how many kids are using these devices?

A: The most recent data we found was that more than 5% of [middle](#)

[school students](#) and 11% of [high school students](#) have used e-cigarettes within the last 30 days, and they are now the most commonly used tobacco products. There has been a 900% increase in their use among school-age users. That seems like a big deal to me.

Q: What was the goal of this study and putting this information out there?

A: Our goal in publishing this was to bring it to people's attention that not only are these e-cigarettes harmful because they're addictive and because they can cause an associated lung injury, which can be fatal, but they also can explode and cause a traumatic [injury](#). We want to educate people and say, "These are the risks that you face when you use [e-cigarettes](#)." We laid out in the paper what the next steps should be, including efforts to decrease [e-cigarette](#) use, improving safety of the devices, and educating clinicians about the risk of device explosion.

**More information:** Katie W. Russell et al, Adolescent Vaping-Associated Trauma in the Western United States, *Journal of Surgical Research* (2022). [DOI: 10.1016/j.jss.2022.02.026](https://doi.org/10.1016/j.jss.2022.02.026)

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