



Authors: Azza H. Ahmed,  
DNSc, IBCLC, CPNP, FAAN,  
Associate Professor.  
Deborah Spoerner,  
DNP, MSN, APRN, CPNP,  
Clinical Assistant Professor.  
Kelly Stephenson,  
Undergraduate honors  
student in Health and  
Kinesiology.

College of Health  
and Human Sciences,  
Purdue University

# The Dangers of Vaping and Electronic Cigarettes among Youth

## What are Electronic Cigarettes?

Electronic cigarettes (e-cigarettes) are devices that produce an aerosol vapor by heating a liquid inside the device. Users inhale the aerosol into their lungs through the device. The aerosol usually includes nicotine, flavorings and other chemicals. The devices, known by the names “e-cigs,” “e-hookahs,” “mods,” “vape pens” or “vapes,” can look like everyday items, such as pens or USB drives, or like regular cigarettes, cigars or pipes.

## How Do Electronic Cigarettes Work?

Electronic cigarettes usually have four components:

- A cartridge used to hold a liquid solution that consists of nicotine, flavorings, and other chemicals
- A heater or vaporizer
- A power source (generally a rechargeable battery)
- A mouthpiece from which users inhale the vapor

Teens often do not know that the liquids in the devices contain nicotine. The liquids can also contain volatile organic compounds, ultrafine particles, cancer-causing chemicals, heavy metals (nickel/tin/lead), and flavorings. One chemical, diacetyl, is common and is linked to severe lung damage.

## Who is at risk?

Nicotine addiction in teenagers is increasing at an alarming rate. In February 2019, the National Youth Tobacco Survey reported that use of e-cigarettes increased 78% from 2017 to 2018.

A typical e-cigarette cartridge, or “pod,” contains about as much nicotine as a pack of 20 regular cigarettes. (U.S. Surgeon General, 2018.) E-cigarette use increased from 11.7% to 20.8% among high school students and from 3.3% to 4.9% among middle school students from 2017 to 2018. There were 1.5 million more youth e-cigarette users in 2018 when compared to 2017. In 2019, according to statistics from NIDA, 25% of 12<sup>th</sup>-graders, 20% of 10<sup>th</sup>-graders and 9% of eighth-graders are vaping nicotine. There are currently 3.6 million youth using e-cigarette products.

## What are the Health Hazards for Teenagers?

Most teenagers do not recognize the negative health effects of e-cigarette usage – or even recognize that e-cigarettes contain nicotine. Teens generally believe that e-cigarettes are safe. In 2018, it was reported that approximately two thirds of e-cigarette users age 15-24 do not know that e-cigarettes always contain nicotine.

For teenagers, the use of e-cigarettes can cause major issues in brain development and respiratory function. External safety risks include fires and explosions.

## Brain development and addiction

A teenager’s brain is rapidly changing and developing new connections. Nicotine changes the way that the brain is formed and has been shown to harm parts of the brain that control attention and learning. E-cigarette use affects brain development by increasing the risk of nicotine addiction, mood disorders, and the permanent lowering of impulse control. Being addicted to nicotine can increase the risk of teenagers becoming addicted to more dangerous substances, such as cocaine, marijuana or alcohol.



## Respiratory Problems

Adolescent e-cigarette users are at increased risk of coughing, wheezing, lung tissue injuries/damage, and asthma exacerbations. Flavorings used in e-cigarettes (such as diacetyl) have been shown to damage lung tissues. Diacetyl is reported to cause what is commonly called “popcorn lung,” an irreversible condition that causes the thickening and narrowing of airways. In a report published by *Environmental Health Perspectives*, it was found that after testing 51 e-cigarette liquids, diacetyl was found in 39 of them.

According to data published in October 2019, there have been 1,080 cases of lung injury reported from 48 states, 1 U.S territory, and 26 deaths in 21 states. All of these cases show a history of e-cigarette product use or vaping.

- 16% of reported cases are in teenagers under the age of 18;
- 80% of reported cases are in people between the ages of 18 and 34.

## References

Azad, A. (2019, June). This teen's vape exploded, shattering his jaw. Retrieved from <https://www.cnn.com/2019/06/19/health/e-cigarette-vape-explode-teen-study/index.html>

Berkeley, Jr. (2019). Vaping illness outbreak surpasses 1,000 cases, 18 deaths with no sign of slowing, CDC says. Retrieved October 4, 2019, <https://www.cnbc.com/2019/10/03/vaping-lung-cases-surge-to-more-than-1000-with-at-least-18-deaths-cdc-says.html>

Center for Disease Control and Prevention (CDC) (2019). Tobacco Use by Youth Is Rising | Vital Signs | CDC. Retrieved from <https://www.cdc.gov/vitalsigns/youth-tobacco-use/index.html>

Cullen, K.A., Ambrose, B.K., Gentzke, A.S., Apelberg, B.J., Jamal, A., King, B.A. *Notes from the Field: Use of Electronic Cigarettes and Any Tobacco Product among Middle and High School Students — United States, 2011–2018*. MMWR Morb Mortal Wkly Rep 2018;67:1276–1277. DOI: <http://dx.doi.org/10.15585/mmwr.mm6745a5external> icon

Kaplan, S. (2019). Teenage Vaping Rises Sharply Again This Year. Retrieved from <https://www.nytimes.com/2019/09/18/health/vaping-teens-e-cigarettes.html>

National Institute on Drug Abuse (NIDA) (2019). Teen e-cigarette use doubles since 2017. Retrieved from <https://www.drugabuse.gov/news-events/news-releases/2019/09/teen-e-cigarette-use-doubles-2017> on 2019, October 4.

Outbreak of Severe Pulmonary Disease Linked with E-cigarette Product Use. (2019). Retrieved from [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/severe-lung-disease.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html)

'Popcorn Lung' Is Another Reason to Put Down the JUUL. (2019). Retrieved from <https://www.health.com/smoking/vaping-what-is-popcorn-lung>

Roberts, C. (2019). Secondhand vaping: How to protect yourself from this new health risk. Retrieved from <https://www.cnet.com/news/secondhand-vaping-the-new-health-risk-you-didnt-even-know-was-an-issue/>