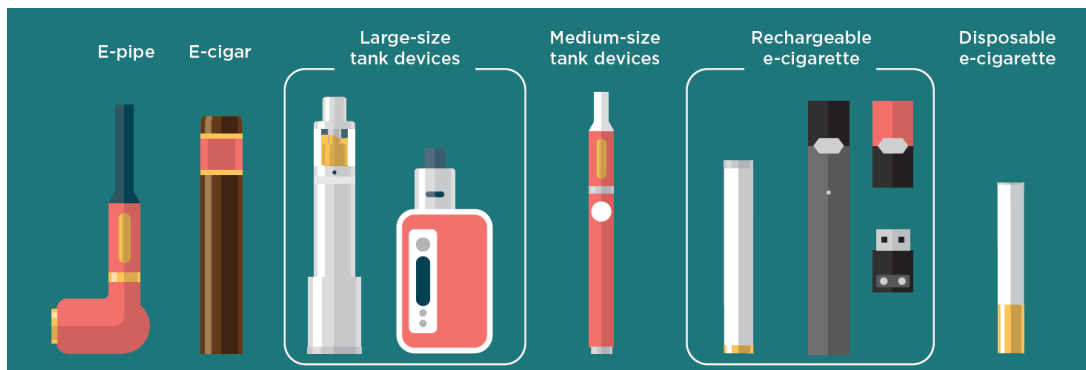


## Children’s Health and Vaping

### *E-cigarettes & electronic nicotine delivery systems (ENDS)*

#### Background

- Vaping, or vaporization, typically utilizes an e-cigarette device. These devices are also called electronic nicotine delivery systems (ENDS) when used with nicotine-concentrated oils. These devices have a variety of names and brands, including Vape Pens, MODS, JUULs, and can mimic pipes, cigars, cigarettes, fountain pens, and external memory sticks.



- Nicotine solutions can have a large range of concentrations (0-100 mg/ml), flavoring chemicals (fruit, candy, mint, etc.), and other ingredients (propylene glycol/glycerin).
- Concentrated marijuana products, such as hash oil and waxes, and other traditionally smoked illicit drugs can also be vaped, including cathinones (“bath salts”, “flakka”), synthetic cannabinoids (“spice”, “k2”), and other hallucinogens [1].
- Advertising and public exposure of adolescents to e-cigarette use is rampant. The Centers for Disease Control and Prevention (CDC) found significant exposure to advertising from at least one source of media to adolescents, which increased every year from 68.9% (18.3 million) to 78.2% (20.5 million). In 2016/2017, there were over 400 e-cigarette websites, and over 7000 unique flavors [2].

#### Epidemiology and Risk Factors of Vaping

- As many as 5% of middle school students and 16% of high school students reported using e-cigarettes in the past 30 days, with reports of high school use increasing by 75% from 2017 to 2018 [3].
- Common reasons for initiation include peer or family member use, flavoring agents, use of other tobacco products, and perception of less risk compared to other forms of tobacco.[4,5] E-cigarette use is also positively and independently associated with progression to smoking, and one-third also report using e-cigarettes for other substances [6,7].

- Other common characteristics in adolescent users are older adolescent age, male gender, impulsive behavior, daily or heavy smoking, sexual promiscuity, in addition to injury and violence co-morbidities
- Compared to non-using peers, teens using only e-cigarettes have higher odds to ever try or currently use marijuana or alcohol, try any illicit drug over a lifetime, and misuse prescription medications [8-12].

### **Known Health Effects from Vaping**

- Clinical symptoms from vaporizing nicotine are similar to other nicotine products including stimulant effects such as tachycardia, hypertension, alertness, and euphoria.
- Nicotine is harmful to the adolescent brain, with risks of addiction, learning, attention, and behavioral health concerns [13].
- Other toxicants, carcinogens, and metal particles are detected in solutions and aerosols found in the cartridges, including benzene, ethylene oxide, acrylonitrile, acrolein, and acrylamide [14].
- Common flavoring agents, such as diacetyl and menthol, may cause oxidative stress, inflammation, endothelial cell dysfunction, impair mucociliary clearance, and cause DNA damage and lung injury [15].
- Adolescent e-cigarette users have increased rates of symptoms of chronic bronchitis, and e-cigarettes are the most common form of tobacco use in adolescents with asthma [16].
- E-cigarettes are a potential source of toxic metals, including chromium, nickel, lead, manganese, and zinc, which are found in the aerosol and tank of e-liquids and e-cigarettes [17].

### **PREVENTION**

- The FDA has heightened their awareness and involvement in the prevention of adolescent use, and plans to expand the public education campaign, *The Real Cost*, to focus on prevention of youth e-cigarette use. They have also threatened to ban the public sale of flavoring agents, such as menthol, which has led companies such as JUUL to remove the sale of these products.
- Healthcare providers should include a discussion of e-cigarettes with families and adolescents when screening for drug use. Although parents may be using, they should counsel patients on the health risks associated with adolescent use.
- Healthcare providers, caregivers, and public health officials can “champion” prevention in their local and regional communities. Advocating for restrictions in advertising and public sale, changing legal age, banning flavoring agents, and other enhanced regulatory oversight.
- Several national organizations such as the [American Academy of Pediatrics](#), [Centers for Disease Control and Prevention](#), [US Food Drug Administration](#), and [National Institute of Health](#) have released policy statements and additional resources for healthcare providers and caregivers.
- Refer adolescents and caregivers to appropriate national and local resources for tobacco and nicotine cessation and addiction treatment, such as [Smokefree.gov](#) and the [Quitline](#).



JUUL

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