

## Electronic Cigarette -Risk to Public Health

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The Health Council of the GCC countries has decided to ban the import and circulation of electronic cigarettes. Consequently, decisions were issued at the national level in all GCC countries by the concerned authorities except the UAE. The ban decision had been approved by the General Secretariat of Municipalities since 2009(Federal Law 15/2009 on Tobacco Control).

Electronic nicotine delivery devices such as electronic cigarettes (e-cigarettes) are battery-powered devices that deliver nicotine, flavorings (e.g., fruit, mint, and chocolate), and other chemicals via an inhaled aerosol. E-cigarettes that are marketed without a therapeutic claim by the product manufacturer are currently not regulated by the Food and Drug Administration (FDA)<sup>1</sup>. \* In many states, there are no restrictions on the sale of e-cigarettes to minors. Although e-cigarette use is increasing among U.S. adolescents and adults<sup>2,3</sup>, its overall impact on public health remains unclear. One area of concern is the potential of e-cigarettes to cause acute nicotine toxicity<sup>4</sup>. To assess the frequency of exposures to e-cigarettes and characterize the reported adverse health effects associated with e-cigarettes, CDC analyzed data on calls to U.S. poison centers (PCs) about human exposures to e-cigarettes (exposure calls) for the period September 2010 (when new, unique codes were added specifically for capturing e-cigarette calls) through February 2014. To provide a comparison to a conventional product with known toxicity, the number and characteristics of e-cigarette exposure calls were compared with those of conventional tobacco cigarette exposure calls.

An e-cigarette exposure call was defined as a call regarding an exposure to the e-cigarette device itself or to the nicotine liquid, which is typically contained in a cartridge that the user inserts into the e cigarette. A cigarette exposure call was defined as a call regarding an exposure to tobacco cigarettes, but not cigarette butts. Calls involving multiple substance exposures (e.g., cigarettes and ethanol) were excluded. E-cigarette exposure calls were compared with cigarette exposure calls by proportion of calls from health-care facilities (versus residential and other non-health-care facilities), demographic characteristics, exposure routes, and report of adverse health effects. Statistical significance of differences ( $p < 0.05$ ) was assessed using chi-square tests.

During the study period, PCs reported 2,405 e-cigarette and 16,248 cigarette exposure calls from across the United States, the District of Columbia, and U.S. territories. E-cigarette exposure calls per month increased from one in September 2010 to 215 in February 2014. Cigarette exposure calls ranged from 301 to 512 calls per month and were more frequent in summer months, a pattern also

observed with total call volume to PCs involving all exposures<sup>5</sup>.

E-cigarettes accounted for an increasing proportion of combined monthly e-cigarette and cigarette exposure calls, increasing from 0.3% in September 2010 to 41.7% in February 2014. A greater proportion of e-cigarette exposure calls came from health-care facilities than cigarette exposure calls (12.8% versus 5.9%) ( $p < 0.001$ ). Cigarette exposures were primarily among persons aged 0–5 years (94.9%), whereas e-cigarette exposures were mostly among persons aged 0–5 years (51.1%) and >20 years (42.0%). E cigarette exposures were more likely to be reported as inhalations (16.8% versus 2.0%), eye exposures (8.5% versus 0.1%), and skin exposures (5.9% versus 0.1%), and less likely to be reported as ingestions (68.9% versus 97.8%) compared with cigarette exposures ( $p < 0.001$ ).

Among the 9,839 exposure calls with information about the severity of adverse health effects, e-cigarette exposure calls were more likely to report an adverse health effect after exposure than cigarette exposure calls (57.8% versus 36.0%) ( $p < 0.001$ ). The most common adverse health effects in e-cigarette exposure calls were vomiting, nausea, and eye irritation. One suicide death from intravenous injection of nicotine liquid was reported to PCs.

Calls about exposures to e-cigarettes, which were first marketed in the United States in 2007, now account for 41.7% of combined monthly e-cigarette and cigarette exposure calls to PCs. The proportion of calls from healthcare facilities, age distribution, exposure routes, and reports of adverse health effects differed significantly between the two types of cigarettes.

This analysis might have underestimated the total number of e-cigarette and cigarette exposures for several reasons. Calls involving e-cigarettes or cigarettes and another exposure were excluded, and the code indicating a case of e-cigarette exposure might have been underused initially. In addition, health care providers, including emergency department providers, and the public might not have reported all e cigarette or cigarette exposures to PCs. Given the rapid increase in e-cigarette-related exposures, of which 51.1% were among young children, developing strategies to monitor and prevent future poisonings is critical. Health-care providers, the public health community, e-cigarette manufacturers, distributors, sellers, and marketers, and the public should be aware that e-cigarettes have the potential to cause acute adverse health effects and represent an emerging public health concern.

Currently, e-cigarettes and their components, such as the nicotine

they contain, that are intended for therapeutic purposes (e.g., for smoking cessation) are drug/device combination products. When they are marketed for therapeutic purposes, they are regulated by the FDA's Center for Drug Evaluation and Research. The FDA's Center for Tobacco Products currently regulates cigarettes, cigarette tobacco, roll your-own tobacco, and smokeless tobacco. FDA has stated its intention to issue a proposed rule extending the FDA's tobacco product authorities beyond these products to include other products like e-cigarettes not intended for therapeutic purposes.

New warnings about vaping issued this week by the World Health Organization have prompted strong pushback from public health experts in the United Kingdom, who charged that WHO was spreading "blatant misinformation" about the potential risks and benefits of e-cigarettes.

The pointed exchange comes amid growing controversy over the value of e-cigarettes, and how to weigh their role as a smoking cessation tool against their potential harms, especially among young people for whom vaping has soared in popularity. The statements align with others made by U.K. public health officials in recent months, which have generally supported vaping as a useful alternative to traditional cigarettes. In contrast, WHO's cautions about vaping echo those voiced by the U.S. Centers for Disease Control and Prevention and some U.S. scientists, who are expressing alarm over both known and still uncertain hazards from vaping. After an outbreak of severe lung disease that's still being investigated and is linked to THC-containing e-cigarettes, CDC now recommends that e-cigarettes of all kinds "never be used by youths."

In a document released, WHO expressed reservations about the value of e-cigarettes and grave concerns about their risks. The organization stated "there is no doubt" that e-cigarettes are harmful to health and are not safe, but it is too early to provide a clear answer on the long-term impact of using them or being exposed to them." WHO also suggested "there is not enough evidence to support the use of these products for smoking cessation," and urged smokers looking to quit to try nicotine patches or gum, or other tools such as hotlines that counsel smokers.

The U.K. response was harsh. "The WHO has a history of anti-vaping activism that is damaging its reputation. This document is particularly malign," Peter Hajek, who directs the Tobacco Dependence Research Unit at Queen Mary University of London, wrote in a statement released today by the U.K. Science Media Centre.

"There is no evidence that vaping is 'highly addictive,'" he said. "Less than 1% of non-smokers become regular vapers. Vaping does not lead young people to smoking—smoking among young people is at an] all-time low. ... There is clear evidence that e-cigarettes help smokers quit," Hajek continued.

E-cigarettes are "clearly less harmful" than tobacco, said John Britton, director of the UK Centre for Tobacco & Alcohol Studies and a consultant in respiratory medicine at the University of Nottingham, in similarly critical comments. "WHO misrepresents the available scientific evidence," he charged. Public Health England maintains that vaping is "at least 95% less harmful than smoking cigarettes."

Earlier, a team of six experts disputed that 95% claim in a publication in the American Journal of Public Health. Led by Thomas Eissenberg, a psychologist at Virginia Commonwealth

University who co-directs the Center for the Study of Tobacco Products and serves as a paid consultant in litigation against the tobacco and e-cigarette industries, the authors suggested there is an "accumulation of evidence of potential harm" from e-cigarettes and "growing evidence that e-cigarette use is associated with subsequent cigarette smoking." Although tobacco use among U.S. middle and high school students has dropped, a 2017 study in JAMA Pediatrics reported that across seven studies that examined initiation of smoking in teenagers and young adults, those who had used e-cigarettes had a 23% chance of starting to smoke, compared with a 7% chance when there was no e-cigarette use.

The short- and long-term risks of e-cigarettes continue to be investigated; whereas many believe the products are lower risk than cigarettes, others say the jury is still out. Studies in animals and people are now exploring whether e-cigarettes pose chronic risks to the lungs and cardiovascular system.

The question of whether e-cigarettes help smokers quit, and at what cost, remains controversial. Tobacco kills more than 8 million people a year worldwide, and many smokers have shared publicly that e cigarettes helped them. A randomized trial run by Hajek and others reported a year ago in The New England Journal of Medicine that e-cigarettes were more effective tools than nicotine replacement therapy when it came to helping smokers quit. As happens often in the vaping field, however, the data came under scrutiny: Subsequent letters to the journal noted, among other concerns, that 40% of the 438 participants assigned to e-cigarettes as a quitting tool were still using them after 1 year, and one-quarter of those in the e-cigarette group wound up becoming "dual users," meaning they both vaped and smoked.

The dispute is unlikely to be resolved soon. But for WHO, the downside of e-cigarettes clearly outweighs their benefits. E-cigarettes "are currently banned in over 30 countries worldwide," the group shared this week, "with more and more countries considering bans to protect young people."

#### Overview:

- No tobacco products, including e-cigarettes, are safe.
- Most e-cigarettes contain nicotine, which is highly addictive and is a health danger for pregnant women, developing fetuses, and youth<sup>6</sup>.
- Aerosol from e-cigarettes can also contain harmful and potentially harmful substances. These include cancer-causing chemicals and tiny particles that can be inhaled deep into the lungs<sup>6</sup>.
- E-cigarettes should not be used by youth, young adults, or women who are pregnant. E-cigarettes may have the potential to benefit adults who smoke and are not pregnant if used as a complete substitute for all smoked tobacco products.
- Scientists still have a lot to learn about the short- and long-term health effects of using e cigarettes.

#### Nicotine

Most e-cigarettes, or vapes, contain nicotine, which has known adverse health effects<sup>6</sup>.

- Nicotine is highly addictive<sup>6</sup>.
- Nicotine is toxic to developing fetuses and is a health danger for pregnant women<sup>6</sup>.
- Acute nicotine exposure can be toxic. Children and adults have been poisoned by swallowing, breathing, or absorbing vaping liquid through their skin or eyes. More than 80% of calls to U.S. poison control centers for e-cigarettes are for

children less than 5 years old.

Nicotine poses unique dangers to youth because their brains are still developing.

- Nicotine can harm brain development, which continues until about age 25<sup>6</sup>.
- Youth can start showing signs of nicotine addiction quickly, sometimes before the start of regular or daily use<sup>6</sup>.
- Using nicotine during adolescence can harm the parts of the brain that control attention, learning, mood, and impulse control<sup>6</sup>.
- Adolescents who use nicotine may be at increased risk for future addiction to other drugs.
- Youth who vape may also be more likely to smoke cigarettes in the future.

### Other potential harms of e-cigarettes

E-cigarette aerosol can contain substances that can be harmful or potentially harmful to the body. These include:<sup>6</sup>

- Nicotine, a highly addictive chemical that can harm adolescent brain development
- Cancer-causing chemicals
- Heavy metals such as nickel, tin, and lead
- Tiny particles that can be inhaled deep into the lungs
- Volatile organic compounds
- Flavorings such as diacetyl, a chemical linked to a serious lung disease. Some flavorings used in e cigarettes may be safe to eat but not to inhale because the lungs process substances differently than the gut.

E-cigarette aerosol generally contains fewer harmful chemicals than the deadly mix of 7,000 chemicals in smoke from cigarettes. However, this does not make e-cigarettes safe. Scientists are still learning about the immediate and long-term health effects of using e-cigarettes.

Dual use refers to the use of both e-cigarettes and regular cigarettes. Dual use is not an effective way to safeguard health. It may result in greater exposure to toxins and worse respiratory health outcomes than using either product alone.

Some people who use e-cigarettes have experienced seizures. Most reports to the Food and Drug Administration (FDA) have involved youth or young adults.

E-cigarettes can cause unintended injuries. Defective e-cigarette batteries have caused fires and explosions, some of which have resulted in serious injuries. Most explosions happened when the batteries were being charged.

Anyone can report health or safety issues with tobacco products, including e-cigarettes, through the FDA Safety Reporting Portal.

### Health effects of vaping for pregnant women

The use of any tobacco product, including e-cigarettes, is not safe during pregnancy. Scientists are still learning about the health effects of vaping on pregnancy and pregnancy outcomes. Here's what we know now:

- Most e-cigarettes, or vapes, contain nicotine—the addictive substance in cigarettes, cigars, and other tobacco products.
- Nicotine is a health danger for pregnant women and is toxic to developing fetuses. • Nicotine can damage a fetus's developing brain and lungs.

- E-cigarette use during pregnancy has been associated with low birth weight and pre-term birth.

### Nicotine addiction and withdrawal

Nicotine is the main addictive substance in tobacco products, including e-cigarettes. With repeated use, a person's brain gets used to having nicotine. This can make them think they need nicotine just to feel okay. This is part of nicotine addiction.

Signs of nicotine addiction include craving nicotine, being unable to stop using it, and developing a tolerance (needing to use more to feel the same). Nicotine addiction can also affect relationships with family and friends and performance in school, at work, or other activities.

When someone addicted to nicotine stops using it, their body and brain have to adjust. This can result in temporary symptoms of nicotine withdrawal, which may include:

- Feeling irritable, jumpy, restless, or anxious
- Feeling sad or down
- Having trouble sleeping
- Having a hard time concentrating
- Feeling hungry
- Craving nicotine

Withdrawal symptoms fade over time as the brain gets used to not having nicotine.

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