



HEALTH ADVISORY - February 2015

A Summary of the Public Health Risks of Electronic Cigarettes

Background

Combustible cigarette smoking is the leading cause of preventable death in the United States and is responsible for more than 480,000 deaths each year. Cigarettes are the most commonly produced tobacco product in the world, accounting for approximately 96 percent of total tobacco sales. Cigarettes are also the most common way people use tobacco globally. It is estimated the tobacco industry spends \$74.3 million on marketing products in Nevada. In Clark County, 19.6 percent of adults and 7.3 percent of high school-aged youth smoke conventional cigarettes.

In response to the increase in tobacco-free policies nationally, the tobacco industry has developed new products, allowing consumers to obtain nicotine without the use of a traditional cigarette. In many instances, these new products are marketed and/or perceived to be “harm reducing” or safe alternatives to conventional cigarettes; however, there is no reliable science to substantiate these claims. Nicotine causes addiction as powerful and self-enforcing as addiction to cocaine and heroin. Eliminating tobacco use and nicotine addiction helps prevent death and disease. Substituting one disease-causing agent for another is not a healthy choice and hinders public health efforts to reduce the toll of death and disease in Nevada.

Electronic cigarettes, e-cigarettes, e-cigs, vape pipes, hookah pens, e-hookahs, or vapors as they are more commonly known, are nicotine-delivery devices that sometimes look like cigarettes in shape, size, and general appearance. These battery-powered devices usually include a battery component, an atomizer, and a cartridge with a mouthpiece. When the smoker puffs on the mouthpiece of the cartridge, the battery causes the tip of the e-cigarette to glow and the heat created by the battery turns the liquid nicotine into an aerosol, or mist, of liquid, flavorings, and nicotine. The aerosol can be breathed in and out by the user, creating a cloud that looks like cigarette smoke. Using an e-cigarette is commonly referred to as vaping.

The e-cigarette is sold as a metal tube that requires refillable containers of nicotine and flavorings, often called juice, and the cartridge generally contains up to 20mg of nicotine or more. Some of the flavors available include coffee, tobacco, apple, strawberry, banana, and bubble gum. The refill bottles contain up to 7 grams of nicotine. There are also numerous inexpensive e-cigarettes available that are disposable and don’t require refilling the cartridge. These products can be discarded once the user depletes the liquid nicotine.

Safety, Quality, and Health Effects of E-Cigarettes

In 2009, the Food and Drug Administration (FDA) tested the ingredients in a small sample of cartridges from the two leading brands of e-cigarettes. They found the samples contained detectable levels of known cancer-causing agents and other toxic chemicals, including diethylene glycol (commonly found in antifreeze) in one cartridge and nitrosamines (a group of carcinogens found specifically in tobacco) in several cartridges. The tests also found that there was no consistency in the levels of nicotine between different products with the same label. Some of the products labeled “no nicotine” still contained low levels of nicotine.

In 2013, published studies indicated that e-cigarettes do not just emit “harmless water vapor.” Secondhand e-cigarette aerosol (misleadingly called vapor by the industry) contains nicotine, ultrafine particles and low levels of toxins that are known to cause cancer. E-cigarette aerosol is made up of a high concentration of ultrafine particles, and the particle concentration is higher than in conventional tobacco cigarette smoke. Exposure to fine and ultrafine particles may exacerbate respiratory ailments like asthma, and constrict arteries which could trigger a heart attack.

At least 10 chemicals identified in e-cigarette aerosol are classified as carcinogens and reproductive toxins. The compounds that have already been identified in mainstream (MS) or secondhand (SS) e-cigarette aerosol include: Acetaldehyde (MS), Benzene (SS), Cadmium (MS), Formaldehyde (MS,SS), and Toluene (MS,SS). E-cigarettes contain and emit propylene glycol, a chemical that is used as a base in e-cigarette solution and is one of the primary components in the aerosol emitted by e-cigarettes. Short term exposure causes eye, throat and airway irritation. Long term inhalation exposure can result in children developing asthma. Even though propylene glycol is FDA approved for use in some products, the inhalation of vaporized nicotine in propylene glycol is not. Some studies show that heating propylene glycol changes its chemical composition, producing small amounts of propylene oxide, a known carcinogen. Furthermore, a recent study released in Science News from John Hopkins School of Public Health showed that e-cigarettes lower immunity for flu viruses and Strep bacteria. The study also concluded that free radicals in the vapor are damaging enough that vaping may be harmful even if nicotine isn't in the vapor.

In 2014, the CDC studied the number of calls to poison centers involving e-cigarette liquids containing nicotine and found the number increased from one per month in September 2010 to 215 per month in February 2014. The number of calls per month involving conventional cigarettes did not show a similar increase during the same time period. More than half (51.1 percent) of the calls to poison centers due to e-cigarettes have involved young children 5 years and under. Like other forms of nicotine, the e-cigarettes and nicotine containers can be deadly to children or pets, who risk nicotine poisoning from ingesting the liquid nicotine. While many people may simply buy refill bottles from a tobacco retail store or vaping shop, some users refill their own cartridges at home. According to the Nevada Poison Center, in 2013 a total of 21 calls were received from Nevada residents related to e-liquid ingestion or exposure. Ten of those calls related to children between the ages of 0-5 years of age. In 2014, calls doubled to 44 and more than 70 percent (31 calls) related to children ages 0-5. Although no deaths have been reported to date in Nevada, half of the callers went to a medical facility to seek treatment. The American Society for Heating, Refrigeration, and Air Conditioning Engineering (ASHRAE), the organization that develops engineering standards for, among other things, building ventilation systems published a recent study that concluded e-cigarettes emit harmful chemicals into the air and need to be regulated in the same manner as tobacco smoking. There is evidence that nitrosamines are carried

over into the e-cigarette fluid from the nicotine extraction process. There is also evidence that the glycol carriers can be oxidized by the heating elements used in e-cigarettes to vaporize the liquids, creating aldehydes such as formaldehyde. Consumers should be warned that, while the health risks associated with the usage of e-cigarettes are less than those associated with tobacco smoking; there remain substantial health risks associated with the use of e-cigarettes.

Regulation of E-Cigarettes

In 2010, following a lawsuit by e-cigarette manufacturers, federal courts ruled that the FDA could regulate e-cigarettes as tobacco products under the Tobacco Control Act, but not as tobacco cessation aids. In 2011, the FDA issued a statement announcing they intend to regulate e-cigarettes as tobacco products, as allowed by the courts, which includes marketing restrictions, mandated ingredient listing and pre-market review. The FDA has yet to issue regulations specific to e-cigarettes, though they are expected to at any time.

At the state and local level, many governments have chosen to limit and regulate e-cigarettes. As of January 2015, 275 municipalities and three states include e-cigarettes as prohibited products for use in smoke free environments. New Orleans recently received national attention as the first major city to pass a smoke-free ordinance that includes e-cigarettes. Many entities have banned the use of e-cigarettes in areas where smoking is already prohibited, by adding vaping to existing smoke-free laws; others are banning or limiting the sale of e-cigarettes to minors. Another approach is to regulate who can sell e-cigarettes, by requiring tobacco retailer licensure in order to sell. In Nevada, no legislated age-restrictions on the sale and use of e-cigarettes currently exists. Additionally, e-cigarettes in Nevada are not taxed as tobacco products, resulting in no generation of tobacco tax revenue. Although, no legislation restricting the use of e-cigarettes exists in Nevada, numerous businesses and organizations have voluntarily implemented restrictions on the use of e-cigarettes indoors and outdoors.

Marketing E-Cigarettes

Just a few years ago, there were only a handful of U.S. companies that sold e-cigarettes, though most e-cigarettes were still made in China. Now, many companies make and sell e-cigarettes, including U.S. tobacco companies such as Altria, Reynolds, and Lorillard. There has been a rapid expansion of marketing e-cigarettes, in print, radio, television, and billboard advertising in Nevada and nationwide. E-cigarettes are often marketed as a way to get nicotine in places where smoking is not allowed or as a recreational alternative to smoking. In April 2014, an investigative report released by 11 members of Congress provides detailed evidence that e-cigarette manufacturers are using the same marketing tactics long used to market regular cigarettes to minors. These tactics include TV and radio ads that reach youth audiences; sponsorships and free samples at youth-oriented events such as auto races and music festivals; celebrity spokespeople who depict e-cigarette smoking as glamorous; and sweet, kid-friendly flavors with names such as Cherry Crush, Chocolate Treat, Peachy Keen and Grape Mint. The report found many e-cigarette companies also use social media to promote their products and have widely varying policies regarding sales to minors, with one company reporting that that it does not have any policy barring such sales. Youth exposure to television ads for electronic cigarettes increased by 256 percent from 2011 to 2013, exposing 24 million U.S. children to these ads, according to a study published in the journal *Pediatrics*. Several e-cigarette marketers are also marketing their products as a means to quit smoking, despite a lack of credible evidence stating they are effective cessation devices.

In the absence of marketing restrictions; billboards, TV, radio, and web advertisements promoting the use of e-cigarettes are visible throughout southern Nevada.

Attitudes and Usages

Sales of e-cigarettes have grown rapidly in the U.S., and after doubling every year since 2008, sales in 2013 accelerated even faster and are projected to reach \$1.7 billion. The cost of e-cigarettes has fallen dramatically, as well, making them more affordable, and thus more attractive to young people. E-cigarette devices may also be used to inhale illegal substances, such as marijuana and hash oil. Since the substance is heated and not burned, the odor is not as obvious as smoking marijuana. Recent findings from the Centers for Disease Control and Prevention show that in 2012, more than 1.78 million middle and high school students nationwide have tried e-cigarettes. Research indicates that aggressive marketing to youth may have played a role in the dramatic increase. Surveys show that more than 40 percent of Americans have heard of e-cigarettes and 70 percent of smokers believe they are less harmful than cigarettes. While local and state level data is not currently available in Nevada; it is expected that e-cigarette usage among youth and adults will mirror national data. A cursory review of business license listings in southern Nevada revealed over 80 businesses with the word vape or e-cigarette in the establishment name.

Conclusion

While more studies are likely to be conducted on the safety of e-cigarettes in the months and years to come, most public health professionals agree it is premature to call e-cigarettes a safe alternative to traditional cigarettes. Additionally, e-cigarettes are not considered approved tobacco cessation aids and should not be marketed as such. The dramatic increase of e-cigarette usage by youth and the ever present marketing of e-cigarettes to all populations have created concern among public health officials. For additional tobacco-related resources, visit www.gethealthyclarkcounty.org.

Recommendations Policy Makers:

- The Southern Nevada Health District supports efforts to protect the public health by including e-cigarettes in clean indoor air laws; implementing marketing, age, and flavor restrictions; taxing e-cigarette components as tobacco products; requiring tobacco retail licensure to sell these products, and restriction of sales to minors. If current e-cigarette trends continue, decades of efforts that have made smoking socially unacceptable will be reversed.

Health Care Providers:

- Ask each patient about their tobacco and nicotine use at each visit.
- Encourage patients to quit all use of tobacco products including e-cigarettes through evidence-based methods such as the Nevada Tobacco Quitline at 1-800-QUIT NOW or (800) 784-8669.
- Restrict the use of e-cigarettes indoors and near entrances and exits to medical facilities. Free downloadable signage is available at www.gethealthyclarkcounty.org.
- Provide scientific information about e-cigarettes and other tobacco products to patients.
- Educate parents and the public to take steps to protect children and themselves from exposure to e-cigarette emissions.

Public:

- Utilize evidence-based methods to quit the use of e-cigarettes and other tobacco products. For free help quitting contact the Nevada Tobacco Quitline. The Nevada Tobacco Quitline offers FREE telephone-based service to Nevada residents 13 years or older, so you can speak to a coach in person. Through the telephone program, you can receive a free supply of nicotine replacement patches, gum, or lozenges. Coaches will determine if you are eligible to receive the nicotine replacement therapy. The Quitline also offers a FREE online service at www.nevadatobaccoquitline.com. When you enroll online, you get special tools, a support team of coaches, research-based information, and a community of others trying to become tobacco free. Expert coaches can talk to you about overcoming common barriers, such as dealing with stress, fighting cravings, coping with irritability, and controlling weight gain. Call 1-800-QUIT NOW or (800) 784-8669 to start the process today.
- Limit using e-cigarettes and other tobacco products around others or near entrances and exits to businesses.
- Declare your home and car e-cigarette and tobacco-free zones.

Sources:

- American Cancer Society, Prevention and Early Detection. *“Guide to Quitting Smoking,”* Revised May 2009
- Americans for Nonsmokers’ Rights, Electronic (e-) Cigarettes and Secondhand Aerosol, 2014.
- American Legacy Foundation. *“Tobacco Fact Sheet: Electronic Cigarettes,”* Revised June 2013.
- American Society for Heating, Refrigeration, and Air Conditioning Engineering (ASHRAE Journal), June 2014
- Campaign for Tobacco Free Kids. *“FDA and the States Must Regulate E-Cigarettes to Protect Public Health: Our Policy Regarding E-Cigarettes,”* July 2013.
- Campaign for Tobacco Free Kids. *“New Study Finds Dramatic Rise in Youth Exposure to E-cigarette Ads on TV,”* June 2, 2014.
- Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. *“Electronic Cigarette Use Among Middle and High School Students — United States, 2011–2012,”* Volume 62, Number 35, September 6, 2013.
- Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. *“Notes from the Field. Calls to Poison Centers for Exposures to Electronic Cigarettes — United States, September 2010–February 2014,”* Volume 63, Number 13, April 4, 2014.
- Cobb, N.K. and D.B. Abrams, E-cigarette or drug-delivery device?
- Consumer Reports, *“E-cigarettes: Still many questions,”* March 2014
- Food and Drug Administration, FDA and public health experts warn about electronic cigarettes. 2009.
- Grana, R., N. Benowitz, and S. Glantz, Background Paper on Ecigarettes. Center for Tobacco Control Research and Education, University of California, San Francisco and WHO Collaborating Center on Tobacco Control, 2013.
- Nevada Poison Center, A. Bronstein, February 4, 2015.
Senator Richard J. Durbin (D-IL), Rep. Henry Waxman, Senators Rockefeller IV, Blumenthal. Markey, Brown, Reed, Boxer, Merkley, and Rep. Pallane Jr. (Report written by staff), *“Gateway to Addiction- A Survey of Popular Electronic Cigarette Manufacturers and Targeted Marketing to Youth,”* April 14, 2014

- London, William M. (2000, July 1) *How addictive is cigarette smoking?*
- Public Health Law and Policy, Technical Assistance Legal Center. “*Electronic Cigarettes: How They Are- and Could Be- Regulated,*” July 2011.
- Sussan TE, Gajghate S, Thimmulappa RK, Ma J, Kim J-H, et al. (2015) “*Exposure to Electronic Cigarettes Impairs Pulmonary Anti-Bacterial and Anti-Viral Defenses in a Mouse Model*”. PLoS ONE 10(2): e0116861. doi:10.1371/journal.pone.0116861