

## The Potential Adverse Health Consequences of Exposure to Electronic Cigarettes and Electronic Nicotine Delivery Systems

Tobacco continues to be the leading cause of preventable death and illness in the United States and the world (World Health Organization, 2011). In addition, tobacco is responsible for one in three cancer deaths in the United States (American Cancer Society, 2015). Prevention of tobacco-related disease, disability, and death could be achieved by promoting tobacco control (i.e., preventing uptake, helping smokers quit, and protecting against exposure to secondhand smoke).

Electronic nicotine devices (ENDs) are advertised as a safe alternative to tobacco products and as a smoking cessation tool. Although evidence is lacking, ENDs may be beneficial in reducing adverse health effects related to tobacco products. However, the safety profile of the devices is unclear.

The ENDs are not a U.S. Food and Drug Administration–approved smoking cessation tool, and the amount of nicotine and other substances a person gets from each cartridge is unclear. As outlined in a report by the Division of Pharmaceutical Analysis (Westenberger, 2009), test results found ENDs to contain nitrosamines and formaldehyde, which are known carcinogens. This analysis also found that ENDs contain toxic chemicals, including diethylene glycol, a chemical found in antifreeze, and impurities found in tobacco (e.g., anabasine, myosmine, b-nicotyrine) that are suspected of causing adverse health effects.

END users not only ingest, but also emit toxins, as well as harmful ultrafine and fine particles. These emissions pose potential health risks similar to secondhand smoke. Many nicotine refill bottles or cartridges are not adequately packaged to prevent contact or accidental ingestion of toxic amounts of nicotine by children. In addition, studies have shown that ENDs can cause respiratory and cardiac changes, much like those caused by regular cigarettes. Whether these are short-term or long-term physiologic changes is unclear (Brandon et al., 2015; Goniewicz et al., 2014).

In another study of more than 1,000 smokers, ENDs users were found to be less likely to stop or cut back on smoking traditional tobacco products (Kim, 2015). According to the study, smokers with any history of END use were less likely than smokers who have never smoked ENDs to decrease cigarette smoking, or completely quit for one month or more, after one year (Kim, 2015).

Some ENDs contain flavorings that seem to appeal to youth. Findings from the National Youth Tobacco Survey showed that ENDs use (at least once per day in the past 30 days) among high school students was on the rise from about 660,000 in 2013 to 2 million students in 2014, an increase of 4.5% to 13.4%, respectively (Centers for Disease Control and Prevention [CDC], 2015). The ENDs use in middle school more than tripled from 120,000 students (1.1%) in 2013 to 450,000 students in 2014 (3.9%) (CDC, 2015). This was the first time since the survey started in 2011 that ENDs use surpassed use of every other tobacco product, including conventional cigarettes. Of interest, the CDC noted that the number of calls to poison centers involving nicotine-containing liquids from ENDs rose 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 demonstrate a similar pattern during the same time period (CDC, 2015).

Nurses can effectively deliver evidence-based interventions for tobacco dependence that reduce tobacco use. Nursing involvement in taking community action, helping patients quit, promoting an environment free of tobacco smoke, and supporting effective tobacco control policies is essential to solving this problem (Sarna, Bialous, Rice, & Wewers, 2009).

### It Is the Position of ONS That

- ONS supports the FDA's draft proposal to regulate ENDs. Until key questions are answered related to whether the benefits of ENDs outweigh the risks, including examining whether ENDs represent a safer alternative to traditional tobacco products and are an effective smoking cessation tool rather than a "gateway" to traditional tobacco products, ENDs should be regulated like other tobacco products.
- Although ONS would have preferred a more stringent regulatory regime, ONS urges the FDA to regulate ENDs as soon as possible. Specifically, the FDA's draft proposal would
  - Deem products, including ENDs, meeting the statutory definition of "tobacco product" to be subject to the Federal Food, Drug, and Cosmetic Act.
  - Prohibit the sale of "covered tobacco products" to individuals aged younger than 18 years and require the display of health warnings on covered tobacco product packages and in advertisements.
- Congress should pass legislation recognizing the danger that liquid nicotine poses to children, giving the U.S. Consumer Product Safety Commission the authority to require the use of childproof packaging on liquid nicotine containers sold to consumers.
- The Department of Transportation should use its regulatory authority to explicitly ban ENDs on aircrafts.
- Nurses should be knowledgeable of and inform consumers about safe, evidence-based tobacco cessation alternatives and inform consumers of the potential harm of ENDs.
- ONS endorses the 2015 ENDs policy statement issued by the American Association for Cancer Research and American Society of Clinical Oncology (<http://bit.ly/1ETcCKO>).

Approved by the ONS Board of Directors,  
June 2015.



## References

- American Cancer Society. (2015). *Cancer facts and figures, 2015*. Retrieved from <http://www.cancer.org/acs/groups/content/@editorial/documents/document/acspc-044552.pdf>
- Brandon, T.H., Goniewicz, M.L., Hanna, N.H., Hatsukami, D.K., Herbst, R.S., Hobin, J.A., . . . Warren, G.W. (2015). Electronic nicotine delivery systems: A policy statement from the American Association for Cancer Research and the American Society of Clinical Oncology. *Journal of Clinical Oncology*, *33*, 952–963. doi:10.1200/JCO.2014.59.4465
- Centers for Disease Control and Prevention. (2015). E-cigarette use triples among middle and high school students in just one year. Retrieved from <http://www.cdc.gov/media/releases/2015/p0416-e-cigarette-use.html>
- Goniewicz, M.L., Jakub, K., Michal, G., Leon, K., Andrzej, S., Jolanta, K., . . . Neal, B. (2014). Levels of selected carcinogens and toxicants in vapor from electronic cigarettes. *Tobacco Control*, *23*, 133–139. doi:10.1136/tobaccocontrol-2012-050859
- Kim, S. (2015). AJPH study: E-cigarette users less likely to stop, cut back on cigarette smoking. Retrieved from <http://www.publichealthnewswire.org/?p=12742>
- Sarna, L., Bialous, S.A., Rice, V.H., & Wewers, M.E. (2009). Promoting tobacco dependence treatment in nursing education. *Drug and Alcohol Review*, *28*, 507–516.
- Westenberger, B.J. (2009). *Evaluation of e-cigarettes*. Retrieved from <http://www.fda.gov/downloads/drugs/scienceresearch/ucm173250.pdf>
- World Health Organization. (2011). WHO report on the global tobacco epidemic, 2011: Warning about the dangers of tobacco. Retrieved from [http://www.who.int/tobacco/global\\_report/2011/en](http://www.who.int/tobacco/global_report/2011/en)