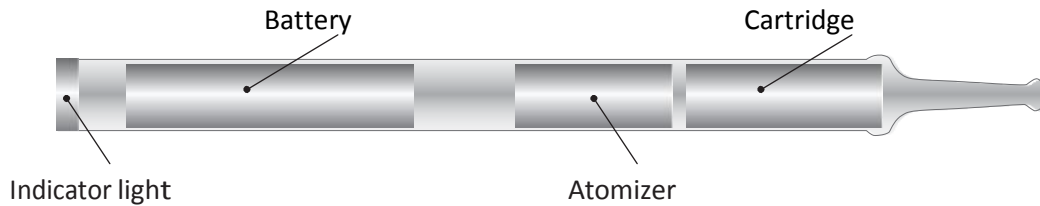


# E-cigarettes and Comprehensive Smoke-free Policies



## What are e-cigarettes?

- Battery operated devices that use a heating element to vaporize nicotine and other substances.<sup>1</sup>
- The user's puff triggers the air flow sensor which lights the LED light in the e-cigarette tip and activates the heating element in the atomizer, creating the vapor.
- E-cigarettes simulate the visual, sensory, and behavioral aspects of smoking.<sup>2</sup>

**Table. Chemicals Found in E-cigarette Cartridges and Vapor**

Chemical	Characteristics Affecting Health & Safety	Where Found
Acetone; Cresol; Xylene; Styrene	Volatile organic compounds can cause negative health effects.	Vapor <sup>3</sup>
$\beta$ -nicotyrine	Cancer causing agent derived from nicotine	Cartridge & vapor <sup>4</sup>
Ethyl alcohol Acetaldehyde	Volatile organic compounds can cause negative health effects.	Cartridge & vapor <sup>3</sup>
Formaldehyde	Cancer causing agent	Cartridge & vapor <sup>3</sup>
Diethylene glycol	Highly toxic impurity of propylene glycol; found in one sample by the US FDA.	Cartridge <sup>4</sup>
Nicotine	Cartridge may contain up to 500 mg of nicotine (approx. 10 times lethal dose). <sup>5</sup> Difficult to refill cartridges without getting liquid on hands. <sup>6</sup> Nicotine from vapor or cartridge spills can react with an element in the air releasing strong carcinogens, which can be inhaled, absorbed through the skin, or taken in by mouth. <sup>7, 8</sup> Nicotine levels are not always accurately portrayed on product labels. <sup>4, 9, 10</sup>	Cartridge <sup>3, 4</sup> & vapor <sup>3, 10</sup>
Propylene glycol	Currently being tested with animals, no known human testing. <sup>11-13</sup>	Cartridge & vapor <sup>3, 4</sup>

## Other health and safety concerns about the use of e-cigarettes

- E-cigarettes are not a proven cessation aid and could derail true cessation attempts.<sup>14</sup>
- Dual use of cigarettes and e-cigarettes will not result in public health benefits.<sup>2</sup>
- Using e-cigarettes in smoke-free areas may cause others to think smoking is allowed, creating enforcement problems.<sup>14</sup>
- Some e-cigarettes are marketed as "green" and "healthy" which may encourage youth to experiment and become addicted.<sup>15</sup>
- Lack of regulation hinders research about safety and efficacy because the product keeps changing.<sup>2</sup>
- Five minutes of e-cigarette use has lung effects similar to tobacco smoking.<sup>16</sup>

## E-cigarette marketing

- E-cigarettes are marketed online with testimonials from people trying to quit, despite the fact that e-cigarettes are not scientifically proven or FDA-approved cessation aids.<sup>15</sup>
- Marketers claim that e-cigarettes can be used where smoking is prohibited.

For more information, contact the Kentucky Center for Smoke-free Policy  
University of Kentucky College of Nursing, 859-323-4587 or [www.kcsp.uky.edu](http://www.kcsp.uky.edu).

# E-cigarettes and Comprehensive Smoke-free Policies

## The FDA and e-cigarettes

- As of December 2010, the U.S. Court of Appeals decided that e-cigarettes can only be regulated as a tobacco product, under the Family Smoking Prevention and Tobacco Control Act, unless marketed as a therapeutic device.<sup>17</sup>
- Regulation development will take time and is in process by the FDA.

## Health agency recommendations on policy

“E-cigarette manufacturers and retailers are making unproven health claims about their products – asserting that they are safe or safer than traditional cigarettes” (p. 1).<sup>18</sup>

“Our organizations support **including e-cigarettes in all new smoke-free laws.**” For existing laws, issuance of “a clarifying opinion” is recommended.<sup>18</sup>



“Marketing and use could undermine public smoking bans, which are important tobacco control interventions” (p. 31).<sup>14</sup>



World Health Organization

“The evidence is insufficient to conclude that any of the electronic nicotine delivery systems products is an effective smoking cessation aid” (p. 32).<sup>14</sup>

## Recommendations for clinicians whose patients wish to quit smoking

- Advise patients to use harm reduction forms of nicotine replacement regulated by the FDA, supplemented by effective telephone quit lines and internet-based services.<sup>19</sup>

1. Flouris AD, Oikonomou DN. Electronic cigarettes: miracle or menace? *BMJ*. 2010;340:c311.
2. Etter JF, Bullen C, Flouris AD, Laugesen M, Eissenberg T. Electronic nicotine delivery systems: a research agenda. *Tob Control*. May 2011;20(3):243-248.
3. Laugesen M. *Safety Report on the Ruyan® e-cigarette Cartridge and Inhaled Aerosol*. Christchurch: Health New Zealand Ltd.; October 30, 2008.
4. Westenberger BJ. *Evaluation of e-cigarettes*: Food and Drug Administration; May 4 2009.
5. Eissenberg T. Electronic nicotine delivery devices: ineffective nicotine delivery and craving suppression after acute administration. *Tob Control*. Feb 2010;19(1):87-88.
6. Trtchounian A, Talbot P. Electronic nicotine delivery systems: is there a need for regulation? *Tob Control*. 2011;20(1):47-52.
7. Sleiman M, Gundel LA, Pankow JF, Jacob P, 3rd, Singer BC, Destailhats H. Formation of carcinogens indoors by surface-mediated reactions of nicotine with nitrous acid, leading to potential thirdhand smoke hazards. *Proc Natl Acad Sci U S A*. Apr 13 2010;107(15):6576-6581. PMID: 2872399.
8. Kuschner WG, Reddy S, Mehrotra N, Paintal HS. Electronic cigarettes and thirdhand tobacco smoke: two emerging health care challenges for the primary care provider. *Int J Gen Med*. 2011;4:115-120. PMID: 3068875.
9. Hadwiger ME, Trehy ML, Ye W, Moore T, Allgire J, Westenberger B. Identification of amino-tadalafil and rimonabant in electronic cigarette products using high pressure liquid chromatography with diode array and tandem mass spectrometric detection. *J Chromatogr A*. Nov 26 2010;1217(48):7547-7555.
10. Trehy ML, Ye W, Hadwiger ME, et al. Analysis of electronic cigarette cartridges, refill solutions, and smoke for nicotine and nicotine related impurities. *Journal of Liquid Chromatography & Related Technologies*. 2011/08/15 2011;34(14):1442-1458.
11. Montharu J, Le Guellec S, Kittel B, et al. Evaluation of lung tolerance of ethanol, propylene glycol, and sorbitan monooleate as solvents in medical aerosols. *J Aerosol Med Pulm Drug Deliv*. Feb 2010;23(1):41-46.
12. Werley MS, McDonald P, Lilly P, et al. Non-clinical safety and pharmacokinetic evaluations of propylene glycol aerosol in Sprague-Dawley rats and Beagle dogs. *Toxicology*. Sep 5 2011;287(1-3):76-90.
13. Dow Chemical Company. A guide to glycols. [http://www.dow.com/PublishedLiterature/dh\\_0047/0901b803800479d9.pdf#page=36](http://www.dow.com/PublishedLiterature/dh_0047/0901b803800479d9.pdf#page=36). Accessed August 14, 2011.
14. World Health Organization. Regulatory scope. Tobacco product regulation. Electronic nicotine delivery systems. *Drug Information*. 2010;24(1):30-32.
15. Yamin C, Bitton A, Bates D. E-cigarettes: a rapidly growing Internet phenomenon. *Ann Intern Med*. 2010;153(9):607-609.
16. Vardavas CI, Anagnostopoulos N, Kougias M, Evangelopoulou V, Connolly GN, Behrakis PK. Acute pulmonary effects of using an e-cigarette: impact on respiratory flow resistance, impedance and exhaled nitric oxide. *Chest*. Dec 22 2011.
17. Kirshner L. D.C. Circuit rules FDA cannot block e-cigarette imports--Sottera, Inc. v. FDA. *Am J Law Med*. 2011;37(1):194-198.
18. American Cancer Society, American Heart Association, The Campaign for Tobacco-free Kids, American Lung Association. Policy guidance document regarding e-cigarettes; June 2011.
19. Cobb NK, Abrams DB. E-cigarette or drug-delivery device? Regulating novel nicotine products. *N Engl J Med*. Jul 21 2011;365(3):193-195.

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