Electronic cigarettes (e-cigarettes) are perceived as an alternative to standard tobacco cigarette smoking, primarily because of the e-cigarette industry’s marketing messages. However, scientific studies about e-cigarette safety and efficacy remain limited. This column presents some of the issues associated with e-cigarette use, such as potential components of regulation, perceptions that e-cigarettes can help users quit smoking, and free-wheeling marketing strategies that include expanding e-cigarette use to young people. Nurses can be a reliable source of information about e-cigarettes.

**Regulation Ahead?**

Few studies have been published documenting the true safety or health risks associated with e-cigarettes. Despite claims in the marketplace, not enough is known about e-cigarettes, their public health benefits, and/or their risks (FDA, 2013a; Riker et al., 2012).

In 2009, the FDA published one of the first seminal studies about e-cigarettes, identifying the carcinogens and toxic chemicals found in them—including diethylene glycol, a toxic ingredient in antifreeze. The report also found inconsistencies in e-cigarettes, with varying nicotine levels per puff and per cartridge. In addition, some e-cigarette cartridges that claimed to be nicotine-free had small amounts of nicotine when analyzed (FDA, 2009).

In September 2010, the FDA issued a number of warning letters to e-cigarette distributors for various violations of the Federal Food, Drug, and Cosmetic Act 4, including “violations of good manufacturing practices, making unsubstantiated drug claims, and using the devices as delivery mechanisms for active pharmaceutical ingredients” (FDA, 2010, p. 1). Since then, the e-cigarette industry has attempted to self-police its claims with uneven consistency, so that e-cigarettes are not considered a drug-delivery device.
and, thus, subject to regulation. Despite pushback from e-cigarette users and the e-cigarette industry, the FDA is in the process of drafting regulations that would affect the manufacturing, marketing, and quality claims of e-cigarettes (FDA, 2013a). Areas of potential regulation are listed in Figure 2.

Recent Studies

Most studies, primarily because e-cigarette use and adoption is relatively new, have not established the long-term health effects of e-cigarettes (see Table 1). Scientifically sound evaluations of e-cigarette chemical properties are limited by sample size and established processes for evaluation (McAuley, Hopke, Zhao, & Babaian, 2012; Williams, Villarreal, Bozhirov, Lin, & Talbot, 2013). Some e-cigarettes do contain carcinogenic—although far fewer than those in cigarettes. But perceptions that e-cigarettes are healthier, relative to cigarettes, are skewed by the fact that cigarette smoking is very toxic, so any alternative will look good in comparison (Gray, 2013). Nevertheless, a study by Vardavas et al. (2012) showed that e-cigarettes have immediate adverse effects similar to the same effects from tobacco smoking.

Studies have been published focusing on e-cigarette usage pattern and perceptions about health risks. Most of the study data are from online survey responses (Adkison et al., 2013; Dawkins, Turner, Roberts, & Soar, 2013; Goniewicz, Lingas, & Hajek, 2013; Hua, Alfì, & Talbot, 2013; Sutfin, McCoy, Morrell, Hoeppner, & Wolfson, 2013), which can introduce a plethora of methodologic concerns.

E-Cigarettes and Smoking Cessation

Another area of inquiry is whether users perceive that e-cigarette usage has helped them reduce or quit cigarette smoking (Caponnetto, Auditor, Russo, Cappello, & Polosa, 2013; Dawkins, Turner, Hasna, & Soar, 2012). These studies, based on respondent perceptions, do not evaluate marketing claims about smoking cessation because the e-cigarette industry has strategically avoided making smoking cessation claims to avoid FDA regulations affecting drug delivery systems. These claims would require expensive and multiyear clinical trials to prove or disprove them (FDA, 2013a; Riker et al., 2012). However, many studies based on user surveys cite anecdotal reports that e-cigarette usage allowed the user to quit smoking cigarettes (Goniewicz et al., 2013; Hua et al., 2013).

Despite the industry’s efforts to avoid marketing e-cigarettes as a means to quit smoking, the public perception is that smoking cessation is one of the advantages of smoking e-cigarettes (Gray, 2013; Riker et al., 2012). A study from the Centers for Disease Control and Prevention (CDC, 2013b) reported that at least one in five smokers has tried e-cigarettes, but also suggests e-cigarettes are not a risk-free alternative to tobacco smoking.

Studies have shown that a majority of smokers and ex-smokers used e-cigarettes to quit (Dawkins et al., 2013). But limited scientific evidence exists showing that e-cigarettes help smokers quit or smoke less, or how safe e-cigarettes are (Caponnetto et al., 2013; Dawkins et al., 2012). No evidence shows nonsmokers become addicted to nicotine because of e-cigarettes (Felberbaum, 2013).

E-Cigarettes and Young People

Whether e-cigarettes lead young people (adolescents and young adults) to try other tobacco products, including conventional cigarettes, is unknown (Hua et al., 2013; Stobbe, 2013). Use by young people still is concerning. A CDC (2013a) study suggested that 20% of middle school e-cigarette users have never tried conventional cigarettes, compared to 7% of high school student e-cigarette users who had never tried conventional cigarettes. The study suggested that e-cigarette interest is growing in middle and high school (CDC, 2013a; Stobbe, 2013).

E-cigarette marketing strategies have not so subtly sought to recruit a younger, loyal market using various e-cigarette colors and a wide variety of flavors (e.g., apple, strawberry, banana, cinnamon roll, peach cobbler, chocolate, vanilla, cherry, menthol, Marlboro, Red Bull), despite a 2009 FDA ban on flavored cigarettes (FDA, 2013b; Gray, 2013; Riker et al., 2012; Stobbe, 2013; U-T San Diego, 2013).

Manufacturing and Marketing

As of late 2013, more than 300 brands of e-cigarettes were being manufactured, with the large tobacco companies poised to make an even bigger play in the marketplace. China is the biggest producer of e-cigarettes and liquid for cartridges (Gray, 2013). Johnson Creek, a U.S. company, produces Smoke Juice, second in revenue only to China. In 2011, Johnson Creek

New Report: 50 Years of Tobacco Use

The U.S. Surgeon General issued a 2014 report chronicling 50 years of tobacco use in the United States. To access, open a barcode scanner on your smartphone, take a photo of the code at left, and your phone will link automatically. Or, visit www.surgeongeneral.gov/library/reports/50-years-of-progress/index.html.
<table>
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<tr>
<td>Adkison et al., 2013</td>
<td>E-cigarette usage pattern</td>
<td>Telephone and web-based survey</td>
<td>5,939 current and former smokers from the United States, Canada, United Kingdom, and Australia</td>
<td>High e-cigarette awareness, particularly among younger, non-minority smokers. 80% who use e-cigarettes consider them less harmful than regular cigarettes. 75% use e-cigarettes to reduce smoking, 85% use e-cigarettes to help quit smoking.</td>
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<td>Caponnetto et al., 2013</td>
<td>Changed smoking habits (reduce, abstain) of smokers with diagnosed schizophrenia (not intending to quit) using e-cigarettes</td>
<td>Convenience sample Evaluation at six study visits</td>
<td>14 smokers (not intending to quit) with schizophrenia</td>
<td>In patients with chronic schizophrenic who smoke but are not intending to quit, use of e-cigarette decreased cigarette use without causing significant side effects.</td>
</tr>
<tr>
<td>Dawkins et al., 2012</td>
<td>Effects of e-cigarettes on desire to smoke, nicotine withdrawal symptoms, attention, and working memory</td>
<td>Random controlled</td>
<td>86 smokers in three groups: (a) 18 mg nicotine e-cigarette (nicotine) (b) 0 mg e-cigarette (placebo) (c) hold the e-cigarette</td>
<td>20 minutes after use, e-cigarette lowered desire to smoke and less withdrawal symptoms; also enhanced working memory performance</td>
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<td>Dawkins et al., 2013</td>
<td>Characterize e-cigarette use, users, and effects</td>
<td>Online survey</td>
<td>1,347 respondents</td>
<td>E-cigarettes were primarily used for smoking cessation. Users feel e-cigarettes are safer than smoking.</td>
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<td>Flouris et al., 2012</td>
<td>Evaluation of acute effect on complete blood count (CBC) of active and passive e-cigarette smokers</td>
<td>Three groups (smoking sessions): control, active, and passive</td>
<td>15 smokers 15 never smokers</td>
<td>E-cigarettes: active and passive smoking does not influence CBC. Tobacco: acute active and passive smoking for first hour increases secondary proteins of acute inflammatory load</td>
</tr>
<tr>
<td>Goniewicz et al., 2013</td>
<td>Patterns and effects of e-cigarettes use E-cigarette user beliefs about safety and benefits</td>
<td>Online survey</td>
<td>179 e-cigarette users</td>
<td>E-cigarettes were used as a stop-smoking aid or tobacco cigarette alternative. Majority of e-cigarette users stated e-cigarettes helped them stop smoking. Most thought e-cigarettes are not completely safe, but safer than conventional cigarettes.</td>
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<td>Hua et al., 2013</td>
<td>Analyze three online e-cigarette forums to establish list of short-term health effects</td>
<td>Evaluation of online e-cigarette forums</td>
<td>Forum posts: E-cigarettes = 543 Vapors = 34 Vapor Talk = 55</td>
<td>405 different symptoms from e-cigarette use (78 positive, 326 negative, and 1 neutral symptom)</td>
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<td>McAuley et al., 2012</td>
<td>Assess potential health impact of e-cigarette use</td>
<td>Control and experimental arms</td>
<td>Cigarette smoke Four different high-nicotine e-liquids vaporized Evaluated emissions and indoor air concentrations of tobacco smoke byproducts</td>
<td>E-cigarettes produce very small exposures compared to tobacco cigarettes.</td>
</tr>
<tr>
<td>Pearson et al., 2012</td>
<td>U.S. adult awareness, use, and harm perceptions about e-cigarettes</td>
<td>One online survey One phone survey</td>
<td>2,649 in a representative online sample 3,658 in a cohort of smokers interviewed via phone</td>
<td>Awareness of e-cigarettes is high. Use is higher among current smokers than total population, former smokers, and never smokers.</td>
</tr>
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<td>Sutfin et al., 2013</td>
<td>Prevalence rates e-cigarette use among U.S. college students</td>
<td>Web-based survey</td>
<td>4,444 college students</td>
<td>E-cigarette use • More common among conventional cigarette smokers; it was not exclusive to them. • Not associated with intentions to quit smoking among conventional cigarette smokers • Does not appear to be motivated by the desire to quit cigarette smoking.</td>
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<td>Vardavas et al., 2012</td>
<td>Assess e-cigarette use (for five minutes) impact on pulmonary function tests</td>
<td>Experimental versus control group</td>
<td>30 e-cigarette use 10 control</td>
<td>E-cigarettes have immediate adverse physiological effects after short-term use (similar to tobacco effects). Long-term e-cigarette effects are unknown.</td>
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</tbody>
</table>
An e-cigarette user will purchase a mouthpiece, replacement liquid for cartridges, or new filled or replaceable cartridges (U-T San Diego, 2013). E-cigarette prices range from $299–$199, with pricing that can rise based on what the market will bear (Gray, 2013; Riker et al., 2012; U-T San Diego, 2013). For pack-a-day smokers, e-cigarette use is cheaper than what conventional cigarette pack-a-day smokers spend on average per year ($2,000 per year) (Gray, 2013).

Marketing Platforms and Strategies

Because e-cigarettes are not yet subject to U.S. tobacco laws, a buyer does not need to show proof of age. E-cigarettes are sold online, contributing to an estimated 30% or more of e-cigarette sales (Gray, 2013). By the end of 2013, the industry estimated $2 billion in sales, with $700 million from online sales alone (Gray, 2013).

So far, anything goes in marketing e-cigarettes. The industry is using some of the same marketing strategies that the tobacco industry used to hook regular smokers decades ago. These advertising methods include mobile billboards, such as cab-top advertisements, bus-stop displays, sponsored race cars and events, and slick television commercials (Felberbaum, 2013; Gray, 2013). The e-cigarette marketing platform delivers a sexy message and promotes an aura of safety. It emphasizes color, sophistication, freedom, equality, and individualism (Gray, 2013). To finance these efforts, e-cigarette marketing budgets are increasing. For the first quarter of 2013, a manufacturer’s marketing budget was a reported $2 million. As of the first quarter of 2013, one marketing budget was an estimated $15.7 million (Gray, 2013). Clearly, manufacturers’ marketing budgets are climbing, if not skyrocketing, very quickly (Edney, 2013).

In addition to potential FDA regulation, e-cigarette use is a focus of cities, counties, and states—to keep smoke shops (e.g., vaping outlets, vape shops) a specific distance from parks and schools. More restaurants, bars, and coffee shops are banning e-cigarette use indoors, as well (Flores & Gerber, 2015).

The e-cigarette industry continues to pursue minimal marketing restrictions (Riker et al., 2012). Protests in legislatures seek to smother restrictions to e-cigarette use in any and all civic arenas.

Implications for Nursing

Nurses are a source of reliable information about e-cigarettes for patients and caregivers and members of their communities. They also can influence or counteract pervasive marketing messages. To date, no scientific evidence supports claims that e-cigarette use is reasonably safe, extremely harmful, or even somewhere in the middle (Riker et al., 2012).

No evidence supports claims that e-cigarettes help patients quit cigarette smoking. Children and teens are particularly vulnerable to unregulated e-cigarette marketing messages and increasing online promotions. Nurses can emphasize factual information, be aware of scientific-based research that informs e-cigarette use, and continue to be public health advocates as more technology-based products grab the public’s attention.

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Gray, E. (2013, September 30). This is not a cigarette: Electronic cigarettes could save lives—Or hook a new generation on nicotine. Time, 38–46.

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