E-cigarettes: A Practical, Evidenced-based Guide for Advanced Practice Nurses
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ABSTRACT
E-cigarettes are gaining popularity as nicotine delivery devices, yet many health care providers lack the confidence to discuss these devices with their patients and families. Many myths exist about e-cigarettes and their effectiveness as a tobacco-cessation method. This article aims to educate nurse practitioners and other advanced practice nurses about e-cigarettes and the implications for patient care, including how to screen for e-cigarette use, identify misconceptions, and counsel patients and families about United States Food and Drug Administration (FDA)–approved tobacco-cessation methods.

Keywords: E-cigarettes, electronic cigarettes, electronic nicotine delivery systems, nicotine replacement therapies, personal vaporizers, tobacco cessation, vape, vaping, vapor

Mary is not alone. Although most health care providers are aware of e-cigarettes, very few have enough knowledge or feel comfortable discussing e-cigarettes with patients or families.1 Unfortunately, health professionals’ knowledge of these devices has not kept pace with their growing popularity. Providers are reporting patients, news stories, and advertisements as the most frequently cited sources of information about e-cigarettes, not professional sources.1 In one study, nurse practitioners (NPs) and nurses had the least amount of comfort and confidence in providing e-cigarette information to patients as compared with physicians and respiratory therapists.2

NPs have an opportunity to include screening and counseling in routine preventive services, especially among young adults and adolescents.1 Advanced practice nurses with up-to-date knowledge about e-cigarettes are better prepared to screen and educate their patients and families about these devices. Well-informed providers are also able to discuss the health-related concerns of e-cigarettes and are better able to provide factual information about United States Food and Drug Administration (FDA)–approved tobacco-cessation methods.
WHAT ARE E-CIGARETTES?
E-cigarettes are battery-operated devices that heat a liquid substance (or e-liquid) into an aerosol, or vapor, which is then inhaled by the user. Not all e-cigarettes/e-liquids contain nicotine; however, when present, nicotine in e-liquids is derived from tobacco. Four principal components comprise an e-cigarette: the battery; the atomizer; the cartridge or tank; and the mouthpiece (see Figure 1). The battery powers the device and the atomizer channels volts of power that heats e-liquid in the cartridge or tank, which then creates a vapor that users inhale through the mouthpiece. Some e-cigarettes require users to take a drag to activate the atomizer; others have manual atomizer activation. These products have been increasing in popularity, and, between 2013 and 2014, their use has tripled nationwide among youth and young adults.

ORIGIN OF E-CIGARETTES
A pharmacist from China invented e-cigarettes in the early 2000s. In 2007, e-cigarettes were patented in the US as an electronic cigarette than can be used as substitutes for conventional cigarettes. Today, e-cigarettes are mostly manufactured in China and used increasingly as a source of nicotine delivery. There are thousands of products on the market that vary in design, use, and functionality, and therefore e-cigarettes are difficult to research and study. However, there is some factual information available about e-cigarettes that can help to initiate meaningful conversations with patients, families, and other health professionals to bridge the knowledge gap of these devices.

VARIATIONS OF E-CIGARETTES
E-cigarettes may be disposable or rechargeable and vary in nicotine content. Some can be refilled with e-liquid, whereas others are closed systems and cannot be refilled. Disposable e-cigarettes mimic the look and feel of conventional cigarettes but are closed system devices that are not refillable or rechargeable. Open systems are larger devices that are rechargeable through a universal serial bus or another charging port and can be refilled with e-liquid. Medium-sized devices are called “vape pens,” whereas large-sized devices are “tank-style” (see Figure 2).

E-cigarettes are available for purchase at most convenience stores, fuel stations, specialty tobacco shops, and through internet retail. Some online retailers verify customer’s age by linking name, address, and birth date through a software verification process. In 2016, there were 500 brands and over 7,000 unique flavors of e-liquids and e-cigarette products.

E-cigarettes can be less costly than conventional cigarettes (see Table 1). For example, the cost for a “pack-per-day” smoker switching from conventional cigarettes to disposable e-cigarettes would be cut in half. Some larger sized, tank-style e-cigarettes have a higher initial cost with the purchase of a starter kit. Users then purchase e-liquid cartridges to refill their devices, which amounts to a lower yearly cost than either disposable e-cigarettes or conventional cigarettes.

E-LIQUIDS
E-liquids, also known as “juice,” are available in many flavors with various nicotine concentrations. Common nicotine concentrations are 0-18 mg of nicotine per 1 mL of base liquids, such as propylene glycol, glycerin, and other natural or artificial flavorings. Glycerin is a natural or synthetic chemical and propylene glycol is a synthetic chemical that the FDA notes as generally recognized as safe for use in food, although there are no reported safe levels when propylene glycol or glycerin is aerosolized for
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