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An Update on Smoking Cessation Treatments and Electronic Cigarettes

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Dr. Kelly Wright has no relevant financial relationships to disclose.

Goal. The goals of this lesson are to provide information on the FDA-approved first-line treatments for smoking cessation, and evaluate the literature regarding the safety and efficacy of electronic cigarettes as a treatment option for smoking cessation.

Objectives. At the completion of this activity, the participant will be able to:

1. state the process of nicotine addiction;
2. identify the FDA-approved first-line pharmacologic and non-pharmacologic treatments indicated for smoking cessation;
3. list patient counseling pearls for each of the pharmacologic treatments discussed;
4. recognize the clinical literature regarding the safety and efficacy of electronic cigarettes for smoking cessation; and
5. recognize the recommendations of national medical societies regarding electronic cigarettes.

Introduction

Tobacco use is still a major public health problem in the United States (U.S.), where nicotine addiction is the most common form of chemical dependence. The most vulnerable in society are at the greatest risk for nicotine addiction, including those with psychiatric comorbidities, other substance use disorders, poverty, genetic predispositions, and low education levels. Tobacco use is also a growing problem in developing nations. Close to 80 percent of the world's smokers live in low- and middle-income countries. The most common form of tobacco use is smoking cigarettes, which will be the focus of this article. Table 1 lists statistics regarding the prevalence of smoking and its staggering cost of lives and resources.

The health risks of smoking are well known, and include chronic obstructive pulmonary disease (COPD), heart disease, infertility, diabetes, ectopic pregnancy, lung cancer, and many other types of cancer. Second-hand smoke exposure also causes significant disease, including stroke, lung cancer, and coronary heart disease in adults, and middle ear disease, respiratory illness, and sudden infant death syndrome in children. Exposure to tobacco smoke caused 108,000 deaths from 1965 to 2014 due to conditions related to pregnancy and birth. Smoking during pregnancy can cause orofacial clefts, other birth defects, and complications such as preterm delivery. Nicotine has lasting adverse effects on the child's developing brain.

Despite these well-known health risks, it is still very difficult for smokers to quit. Even though 70 percent of smokers want to quit, few are able to do so without professional assistance and multiple attempts.

Nicotine, the addictive ingredient found in tobacco, causes central and peripheral nervous system stimulation and depression, and at high doses stimulates the "reward" center in the limbic system of the brain. Nicotine exposure by smoking is extremely addictive compared to other routes of absorption, because when inhaled it can cause central nervous system (CNS) stimulation in as little as seven seconds. Repetitive exposure to nicotine causes neuroadaptation, leading to tolerance of the initial effects of the drug and a higher threshold for its pleasurable effects.

Consequently, the three components of nicotine addiction are:

Table 1
Smoking statistics

	United States	Globally
Total deaths due to smoking each year	480,000	6 million
Deaths due to second-hand smoke each year	41,000	600,000
Cost of smoking-related illness each year	$300 billion	–
Adults who are current cigarette smokers	42.1 million	1 billion
Percent of population who smoke	17 percent	–

Table 2
First-line smoking cessation treatments

	OTC	Generic	Dosing	EAR* at 6-months postquit
Nicotine Patch	X	X	Step 1 (21 mg/day) Step 2 (14 mg/day) Step 3 (7 mg/day) Apply once daily; wear for 24 hours.	23.4% - 26.5 % + *ad lib* nicotine = 25.8% - 36.5%
Nicotine Gum	X	X	2 mg 4 mg Chew 1 piece every 1-2 hours or as needed for nicotine cravings.	19.0% - 26.1%
Nicotine Lozenge	X	X	2 mg 4 mg Use one lozenge every 1-2 hours or as needed for nicotine cravings.	23.6% - 24.2%
Nicotine Nasal Spray (Nicotrol NS®)			1-2 sprays/hour; do not exceed 10 sprays/hour.	26.7%
Nicotine Inhaler (Nicotrol®)			Puff 6-16 cartridges per day.	24.8%
Bupropion SR (Zyban®)	X		150 mg once daily for three days, then increase to 150 mg twice daily.	24.2% + patch = 28.9%
Varenicline (Chantix®)			Initiate 0.5 mg once daily, then titrate to 1 mg twice daily as instructed by Chantix Starting Month Pak.	25.4%

*EAR = estimated abstinence rates. Placebo EAR = 13.8 percent.

physical, emotional/psychological, and social/behavioral (i.e., habit). Physical dependence on nicotine causes smokers to experience withdrawal symptoms such as headache, upset stomach, and irritability when their nicotine levels are low. The emotional dependence on nicotine varies greatly between individuals and can include links to stress management and coping, enjoyment of other activities, mental illness, and many other aspects of the smoker's life. Smoking is a habit that is often ingrained into the smoker's life and is difficult to replace without professional guidance. Common smoking habits include smoking after meals, with coffee or alcohol, when around other smokers, and while driving.

Given the multi-faceted depth of the smoking addiction, arresting the habit is difficult and relapse frequently occurs, even when the individual is seriously committed to quitting. Therefore, it is vital to establish effective and accessible treatment options to help patients achieve smoking cessation.

Smoking Cessation Treatments

The addiction to nicotine is a chronic condition which often requires repeated interventions, but effective treatments do exist. Health care providers should follow the "5 A's" model described in the *Treating Tobacco Use and Dependence: 2008 Update* guidelines by 1) asking every patient about tobacco use at every visit, 2) advising every tobacco user to quit, 3) assessing the willingness of the tobacco user to make a quit attempt at this time, 4) assisting in the quit attempt by offering or referring elsewhere for medication and counseling, and 5) arranging follow-up for those willing to make a quit attempt.

There are currently seven first-line medication options for smoking cessation. Table 2 lists them and identifies their OTC and generic availability, as well as initial dosing and estimated abstinence rates (EAR). The EAR data is from a 2008 meta-analysis of 83 studies that is also reported in the guidelines. The combination regimens with nicotine patches (patch + *ad lib* nicotine OR bupropion SR) have the highest reported EARs. The decision of which medication or combination regimen to use should be based on patient preference, appropriateness of therapy, cost, availability, and clinical judgement.

There is important information to consider when deciding which product to recommend. Nicotine is the active ingredient in all five of the nicotine replacement therapy (NRT) dosage forms. Although the mechanism of action of nicotine is the same as that from cigarettes, the dosage form has a great impact on its absorption, onset, duration of action, and potential for dependence. Patients using NRT are often concerned about becoming dependent on those products. Pharmacists can help patients understand that since these products are not inhaled into the lungs, it takes the nicotine longer to reach the

brain, thereby greatly reducing the potential for euphoric effects and addiction. The patch is absorbed transdermally, with an onset of action of one to two hours and a duration of action of 24 hours. The lozenge, gum, and nicotine inhaler are absorbed through the buccal mucosa, with an onset of action of five to 10 minutes and a duration of action of one to four hours. The nasal spray is intended to be absorbed through the nasal mucosa, with a similar onset of action and duration of action to the products absorbed through the buccal mucosa. However, it has the highest risk of being inhaled into the respiratory track which increases its risk for dependence. The nasal spray is used less frequently than the other options, due to its significant side effects, contraindication in severe reactive airway disease, and higher potential for dependence. For patient counseling information on the common side effects of NRT, see Table 3.

In 2013, the Food and Drug Administration (FDA) announced that OTC nicotine replacement products could change their labeling to be less restrictive. As clinicians have known for some time, it is safe to use these products while still smoking, and to continue using them for longer than a few months. The OTC labeling no longer forbids using NRT concurrently with tobacco products. This benefits smokers who are ready to cut back but not ready to quit altogether. Many patients need several weeks or even months of therapy before they are able to achieve complete abstinence.

The mechanism of action of bupropion SR (Zyban®) in smoking cessation is not well understood. Originally developed as an antidepressant, it inhibits neuronal uptake of norepinephrine and dopamine. In clinical practice in the U.S., it was observed that bupropion SR had smoking cessation properties. Subsequent clinical trials confirmed these observations and the drug received FDA approval for smoking cessation. Bupropion SR is generally well-tolerated, but may cause some side effects due to CNS stimulation (agitation, anxiety, insomnia, anorexia) and

Table 3
Patient counseling pearls for first-line smoking cessation medications

Nicotine Patch	Apply the patch in the morning and wear for 24 hours. If vivid dreams or insomnia occur and are bothersome, remove it 1-2 hours before bed and apply a new patch first thing in the morning. The patch will take 1-2 hours to become effective, so patients may experience withdrawal symptoms in the morning. Rotate application sites to avoid skin irritation. Apply to non-hairy areas to avoid pain upon removal. To prevent accidental exposures, fold the sticky side of the patch onto itself before discarding. If patch does not adhere to the skin well, bandages or tape can help hold it in place.
Nicotine Gum	Chew slowly until peppery/minty taste, then park between cheek and gums to minimize saliva secretion. When the taste goes away, repeat this process until the taste does not return with chewing. Many patients do not like the taste. Proper technique should help minimize any offensive taste and avoid stomach upset. Avoid food or beverages 15 minutes before, during, and after chewing. This product may be difficult to use for patients with dental issues or dentures.
Nicotine Lozenge	Park the lozenge between cheek and gums to minimize saliva secretion. Let the lozenge dissolve in the mouth; do not chew, crush, break, or swallow. Many patients do not like the taste of the lozenge. Proper technique should help minimize any offensive taste and avoid stomach upset. Avoid food or beverages 15 minutes before, during, and after use.
Nicotine Nasal Spray (Nicotrol NS®)	Patients may experience moderate to severe nasal irritation upon initiation of the nasal spray. These side effects may improve with continued use. Do not use in patients with severe reactive airway disease. The spray has highest dependence potential of the NRT products, because there is a higher chance that it will enter the airway. Do not use for a longer duration than prescribed. Tilt head slightly back when administering. Do not sniff, swallow, or inhale through the nose.
Nicotine Inhaler (Nicotrol®)	Use package instructions to show patients how to insert cartridge, put their lips around the mouthpiece, and inhale or "puff." One cartridge lasts about 20 minutes of active puffing, although this varies based on the intensity of puffing. The cartridge does not have to be used all at once. Although it is called an "inhaler," the powder is not inhaled into the respiratory tract, rather it is absorbed into the buccal mucosa, similar to the gum and lozenge. Therefore, its dependence potential is very low. Avoid food or beverages 15 minutes before, during, and after use. Mild side effects of local irritation, cough, and rhinitis may occur initially, but will usually improve with continued use.
Bupropion SR	This medication works in the brain to help decrease cravings for nicotine. Patients experience reduced cravings for cigarettes, decreased interest in smoking, and enhanced sensitivity to the unpleasant taste and smell of cigarettes. Avoid in patients with current or past seizure disorders, use of MAO inhibitor in the last 14 days, history of anorexia or bulimia, or potential for alcohol withdrawal. Report any mood changes or suicidal thoughts or actions immediately.
Varenicline (Chantix®)	This medication works in the brain to help decrease cravings for nicotine. Patients experience reduced cravings for cigarettes, decreased interest in smoking, and enhanced sensitivity to the unpleasant taste and smell of cigarettes. Report any mood changes or suicidal thoughts or actions immediately. Take with food to avoid nausea or upset stomach. May cause strange/vivid dreams or insomnia.

cognitive impairment in the first few weeks of therapy. Patients may develop tolerance to these side effects. Other possible side effects include headache, xerostomia, and tachycardia.

Bupropion SR carries a *Boxed Warning* that it increases the risk of suicidal thinking and behavior in children, adolescents, and young adults with major depressive disorder and other psychiatric disorders. Another *Boxed Warning* states serious neuropsychiatric events have occurred in patients taking it for smoking cessation, with a note that "a causal relationship is uncertain as depressed mood may be a symptom of nicotine withdrawal." Bupropion SR is contraindicated in patients at risk for seizures, including those with a history of seizures, eating disorders, or alcohol dependence.

Varenicline (Chantix®) is a partial neuronal nicotine receptor agonist. It partially stimulates the dopaminergic "reward" pathway in the brain while preventing nicotine from fully activating the pathway. Common adverse effects of varenicline include nausea, vomiting, vivid dreams, sleep disturbances, and irritability. It carries the following *Boxed Warning*: "Serious neuropsychiatric events (including depression, suicidal thoughts, and suicide) have been reported with use; some cases may have been complicated by symptoms of nicotine withdrawal following smoking cessation."

It is important that patients have a good understanding of their medication, including proper administration, appropriate treatment expectations, and how to avoid/manage side effects. Patients on bupropion SR and varenicline should be educated about and monitored closely for mood changes and suicidal thoughts, despite the rarity of these events. Smoking is not contraindicated while taking either of the oral medications. Positive responses to both medications are usually described by patients as: decreased desire to smoke, cigarettes start to taste and smell badly, and decreased pleasure from smoking. Table 3 provides additional patient counseling pearls for each of the first-line medications for smoking cessation.

Along with medication options, patients should receive motivational and practical counseling, as well as intratreatment social support. Even brief counseling is effective, however, there is a strong dose-response relationship between the intensity of counseling and its effectiveness. Motivational Interviewing (MI) is a directive, patient-centered counseling intervention that is effective in increasing future quit attempts. It should be used with patients who are not ready to quit, or who are experiencing ambivalence while trying to quit. For a full summary of the use of MI in smoking cessation, refer to the *Treating Tobacco Use and Dependence: 2008 Update*. Practical counseling (i.e., problem-solving, skills training) should be provided to patients who are motivated to quit (see Table 4). Intratreatment social support includes encouraging the patient and communicates care and concern. The need for proper counseling to reach abstinence cannot be overemphasized.

Electronic Cigarettes

Electronic cigarettes (i.e., e-cigarettes, e-cigs) are battery powered devices that heat a solution in a disposable cartridge to produce an aerosol which can be inhaled in a manner similar to cigarette smoke (Figure 1). The use of e-cigarettes is often called "vaping," and e-cigarette users may be described as "vapers." These terms are actually misnomers as the aerosol produced is technically not a vapor because it has a particulate phase, not just a gas phase. The solution in the cartridge (i.e., e-juice, e-liquid) is often flavored and usually contains a mixture of propylene glycol and/or vegetable glycerin and nicotine. There are hundreds of flavors available, including ones that were banned from cigarettes because they specifically appeal to children (e.g., bubble gum, cherry, strawberry). The first generation of products resemble tobacco cigarettes, and some are even disposable. Newer to the market are e-cigarettes that do not resemble tobacco cigarettes; they vary in size, color, and shape, and can be filled with customized liquid.

E-cigarettes were introduced to the U.S. market in 2007, and

Table 4
Examples of counseling

Practical counseling treatment component	Examples
Identify events, internal states, or activities that increase the risk of smoking or relapse.	• Negative affect and stress • Being around other tobacco users • Drinking alcohol • Smoking cues, availability of cigarettes
Identify and practice coping or problem solving skills.	• Learning to anticipate and avoid triggers • Learning cognitive strategies that will reduce negative moods • Accomplishing lifestyle changes that reduce stress, improve quality of life, and reduce exposure to triggers • Learning cognitive and behavioral activities to cope with smoking urges (e.g., distracting attention; changing routines)
Provide basic information about smoking and successful quitting.	• Any smoking (even a single puff) increases the likelihood of a full relapse. • Withdrawal symptoms typically peak within 1–2 weeks after quitting, but may persist for months. • Addictive nature of smoking

Figure 1
Anatomy of e-cigarettes

*Adapted from: Orellana-Barrios MA, Payne D, Mulkey Z, Nugent K. Electronic Cigarettes — A Narrative Review for Clinicians. *The American Journal of Medicine* 2015;128:674-681.

their use grew rapidly from 2011 to 2014 as advertising for the products increased. Youth exposure to e-cigarette advertisements increased 256 percent from 2011 to 2013, and young adult exposure increased 321 percent in the same period. In 2013, e-cigarette sales reached approximately $1.7 billion. This was the year when big tobacco companies began to buy up smaller e-cigarette companies and heavily market the products as a safe and effective smoking cessation treatment. According to the 2014 Surgeon General's report, tobacco companies have historically used any means possible to recruit new nicotine addicts, and have often targeted vulnerable populations such as the poor, minorities, and adolescents. At the time of publication of this CPE lesson, there is ongoing debate in the medical community on the potential of e-cigarettes as smoking cessation treatments and the significance of the many safety concerns associated with them.

E-Cigarette Safety Concerns

Some of the most common safety concerns regarding e-cigarettes include:

1. Lack of regulation. E-cigarettes are produced by many companies and, at the time of publication, are completely unregulated in the U.S. Therefore, it is difficult to assess their safety because the ingredients and manufacturing procedures are relatively unknown. Studies have found many surprising substances in e-cigarettes, including tobacco-specific nitrosamines, tobacco alkaloids, aldehydes, metals (e.g., cadmium, nickel, lead, chromium, arsenic), and the drugs tadalafil and rimonabant. The findings vary significantly by brand of e-cigarette. There have even been reports of nicotine found in solutions marketed as having "no nicotine."

Since they are unregulated and sold online, anyone with access to online payment may purchase them, which makes them easily accessible to minors. Without regulation, companies that produce e-cigarettes can freely market a highly addictive product without any type of quality assurance or safety mechanisms (e.g., childproofing).

At the time of publication, FDA is developing national regulations for e-cigarettes. The current plan is to regulate the sale of e-cigarettes to minors and marketing techniques. Many countries already regulate e-cigarettes. The European Parliament issued a directive in 2014 to regulate the solution composition and marketing strategies of e-cigarettes. Some countries (e.g., Austria, Brazil, Argentina) have completely banned e-cigarettes, while others have implemented some type of tiered regulation, such as only allowing e-cigarettes without nicotine (e.g., Australia, Belgium).

2. Negative health effects on the user and those with second-hand exposure. There are concerns that the nicotine, propylene glycol, and other constituents in e-cigarettes may cause lung damage and other health problems, in both the user and those exposed second-hand. Clinical studies have shown that e-cigarette use may increase heart rate, decrease exhaled nitric oxide (FeNO), and increase airway resistance. However, these products have not been around long enough for there to be any evidence regarding their long-term risks. Many manufacturers of e-cigarettes claim them to be healthier than smoking. Some preliminary evidence supports this claim, but cigarettes still kill up to 50 percent of people who use them. Although e-cigarettes are likely safer than cigarettes, they aren't necessarily "safe." Similarly, there are studies that demonstrate the potential for harm from second- and third-hand exposure to e-cigarette aerosols, but there is not enough information at the time of publication to make any conclusive statements about the significance of this harm. While there are no data on the effects of e-cigarettes in pregnancy, it is important to note that any nicotine exposure is harmful to maternal and fetal health during pregnancy and should be avoided.

3. Potentiation of nicotine addiction and renormalization of smoking. The nicotine obtained through e-cigarettes is addictive via the same mechanism previously described for tobacco cigarettes, since it is inhaled. Addiction itself is a disease, regardless of the physical effects of the addictive product. Nicotine addicts have more stress and other mental health disorders than non-addicts. The evidence is suggestive that nicotine exposure during adolescence, a critical window for brain development, may have lasting adverse consequences for brain development. There is concern that e-cigarettes will renormalize smoking behaviors. The FDA-approved smoking cessation treatments are intended to help nicotine addicts recover from their addiction, whereas e-cigarettes are typically thought of as a "safer" way to continue the addiction. This perpetuation of addiction leads to

many smokers becoming dual users of e-cigarettes and tobacco cigarettes.

E-Cigarettes: A Treatment Option for Smoking Cessation?

Overall, there is a general consensus among healthcare professionals that e-cigarettes need to be regulated, should be avoided by people who do not already have a nicotine addiction, are likely safer than cigarettes for current smokers, and that the long-term risks of these products are not known. However, there is debate in regards to recommending e-cigarettes as smoking cessation aids. E-cigarette manufacturers have been promoting them to smokers for cessation since they entered the market, and some physicians recommend them for this purpose. At the time of publishing, there are no current applications to FDA for approval of any e-cigarette product, but this has occurred in other countries and will likely happen at some point in the U.S.

E-cigarettes are considered to have potential as a smoking cessation aid because they address all three components of nicotine addiction, which were discussed previously in this lesson. It is theorized that they could address the addiction better than current FDA-approved products, because they can create an experience more similar to smoking.

Overall, there is still very little research to give health professionals insight into the effectiveness of e-cigarettes in helping people quit smoking. There have only been two randomized, controlled clinical trials evaluating e-cigarettes for smoking cessation, and both have major quality issues.

In the study by Bullen *et al.* (2013), achievement of abstinence in all groups was substantially lower than anticipated and led to insufficient statistical power to conclude superiority of e-cigarettes to patches or placebo. Caponnetto *et al.* (2013) found that in smokers not intending to quit, the use of e-cigarettes decreased conventional cigarette consumption and led to lasting tobacco abstinence without causing serious side effects. However, the study design limits the generalizability of the results. For example, participants were told that e-cigarettes are a healthier alternative to tobacco, e-cigarettes and cartridges were provided to the participants at no cost, and data regarding vaping and smoking were obtained from patient diaries.

Several surveys of e-cigarette users have been described in the literature, with mixed results and varying levels of quality. One especially rigorous study (Borderud *et al.*, 2014) measured these outcomes: 1) prevalence of e-cigarette use among smokers referred to an on-site tobacco treatment program at a comprehensive cancer center; 2) temporal trends in e-cigarette use; 3) characteristics of e-cigarette users compared with those of non–e-cigarette users; and 4) whether e-cigarette use is associated with smoking cessation outcomes. They found that when compared to non-e-cigarette users, e-cigarette users smoked more cigarettes per day and reported higher nicotine dependence scores. The self-reported seven-day point prevalence abstinence rate was twice as high for non-e-cigarette users compared with e-cigarette users (30 percent vs 14.5 percent; $P < .01$). After adjusting for nicotine dependence, number of past quit attempts, and cancer diagnosis, e-cigarette users were twice as likely to be smoking at follow-up compared with nonusers.

In July 2014, The Tobacco Action Committee of the American Thoracic Society (ATS) and the Forum of International Medical Societies issued this statement: "As a precaution, electronic nicotine delivery devices should be restricted or banned until more information about their safety is available." The ATS notes that e-cigarettes do not have FDA approval, and, therefore, should not be recommended as smoking cessation therapy.

That same month, the Ameri-

Table 5
Summary of AHA policy positions*

- Supports the inclusion of e-cigarettes in smoke-free air laws, state and federal laws and regulations that prohibit the sale of e-cigarettes to minors, and laws that restrict the marketing and advertising of e-cigarettes to minors.
- Supports including e-cigarettes in the definition of tobacco products (or tobacco-derived products) and smoking, not by creating a separate definition for e-cigarettes, because a separate definition can create a risk of e-cigarettes being exempted from other tobacco control laws, including smoke-free laws. E-cigarettes defined as tobacco products could still be treated differently within taxation legislation and regulation.
- Supports taxing e-cigarettes at a rate high enough to discourage youth use, while retaining or increasing differentials with combustible products by increasing taxes on combustibles. Any revenue generated through taxation ideally should support tobacco cessation and prevention programs.
- Supports effective FDA regulation of e-cigarettes that addresses marketing, youth access, labeling, quality control over manufacturing, free sampling, and standards for contaminants. Bottles should have proper warning labeling and child-proof packaging. Companies should not be able to claim that e-cigarettes are a cessation aid unless they are approved by the FDA for that purpose.
- Maintains that e-cigarette use should be part of tobacco screening questions. Clinicians should be educated about e-cigarettes and should be prepared to counsel their patients regarding comprehensive tobacco cessation strategies. There is not yet enough evidence for clinicians to counsel their patients who are using combustible tobacco products to use e-cigarettes as a primary cessation aid.
- Recognizes the need to improve and increase surveillance on e-cigarette use throughout the U.S. and global population and establish a research agenda to elucidate the longitudinal public health impact of e-cigarette use.

*Adapted from Electronic cigarettes: policy statement from the American Heart Association. *Circulation*. 2014;130(16):1418-1436.

can Heart Association (AHA) released a detailed policy statement, summarized in Table 5. The statement also takes a conservative approach to the issue, recommending that e-cigarettes be included in the legal definition of "tobacco products," but does acknowledge that pending appropriate research and subsequent FDA approval, e-cigarettes could be used for smoking cessation in the future.

The current debate on e-cigarettes for health care professionals may come down to this question: Do the risks of increasing and perpetuating nicotine addiction in our society outweigh the benefits of a healthier alternative to smoking? The AHA's solution to this question is that "regulation should allow for quality-controlled products for adults who want to transition from conventional cigarettes to e-cigarettes or to quit or reduce smoking." They also state that they "will continue to monitor the evidence concerning e-cigarettes as cessation devices."

Conclusion

There are safe and effective treatments available for patients who are motivated to quit smoking. Health care professionals should recommend FDA-approved first-line treatments to patients who wish to stop using tobacco, per the *Treating Tobacco Use and Dependence: 2008 Update* guidelines, preferentially to e-cigarettes at this time, due to their lack of regulation and the lack of evidence to support their safety and efficacy. In addition, Motivational Interviewing and practical counseling should be provided to smokers who are uninterested in quitting and those who are motivated to quit, respectively. In the future, if e-cigarettes are regulated, studied, and approved as safe and effective by FDA, they may be integrated into comprehensive tobacco cessation strategies. Healthcare professionals should engage their patients and the public with factual information on this important topic.

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This lesson is a knowledge-based CPE activity and is targeted to pharmacists in all practice settings.

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continuing education quiz

An Update on Smoking Cessation Treatments and Electronic Cigarettes

1. Which of the following is a risk factor for nicotine addiction?
   a. African-American ethnicity
   b. College education
   c. Poverty
   d. Asthma

2. By which route of administration/absorption does nicotine reach the brain most quickly?
   a. Inhalation
   b. Transdermal
   c. Buccal
   d. Gastrointestinal

3. Which of the following is a symptom of nicotine withdrawal?
   a. Hallucinations
   b. Irritability
   c. Seizures
   d. Vomiting

4. Which component of the "5 A's" model in the *Treating Tobacco Use and Dependence Update 2008* should be used at every patient visit?
   a. Ask
   b. Arrange
   c. Assess
   d. Assist

5. Which nicotine product has the highest dependence potential?
   a. Gum
   b. Inhaler
   c. Nasal spray
   d. Patch

6. Which of the following counseling points is accurate regarding the nicotine patch?
   a. Apply to the same location every day.
   b. Smoking is contraindicated while wearing the patch.
   c. If a lower dose is needed, the patch may be cut.
   d. Fold the patch onto itself before discarding.

7. Which is an accurate counseling point to provide for the nicotine lozenge?
   a. Take up to two lozenges at a time as needed.
   b. Do not eat or drink within 15 minutes of using the lozenge.
   c. Chew the lozenge if a quick effect is needed for withdrawal symptoms.

Completely fill in the lettered box corresponding to your answer.

1.	[a]	[b]	[c]	[d]	6.	[a]	[b]	[c]	[d]	11.	[a]	[b]	[c]	[d]
2.	[a]	[b]	[c]	[d]	7.	[a]	[b]	[c]		12.	[a]	[b]	[c]	
3.	[a]	[b]	[c]	[d]	8.	[a]	[b]	[c]	[d]	13.	[a]	[b]	[c]	
4.	[a]	[b]	[c]	[d]	9.	[a]	[b]	[c]	[d]	14.	[a]	[b]	[c]	
5.	[a]	[b]	[c]	[d]	10.	[a]	[b]	[c]	[d]	15.	[a]	[b]	[c]	

❑ **I am enclosing $5 for this quiz made payable to Ohio Pharmacists Association.**

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8. Which of the following is contraindicated in patients with severe reactive airway disease?
   a. Nicotine inhaler
   b. Bupropion SR
   c. Nicotine nasal spray
   d. Nicotine lozenge

9. Which of the following should be avoided in patients with seizures?
   a. Nicotine patch
   b. Nicotine inhaler
   c. Bupropion SR
   d. Nicotine spray

10. Which treatment is recommended for a smoker who is not ready to make a quit attempt?
   a. Nicotine gum
   b. Practical counseling
   c. Varenicline
   d. Motivational interviewing

11. Which of the following negative health effects has been reported in clinical studies with e-cigarettes?
   a. Heart disease
   b. Increased airway resistance
   c. Lung cancer
   d. Stroke

12. Which of the following is NOT a major safety concern with e-cigarettes?
   a. They may be more dangerous than conventional cigarettes.
   b. They are unregulated and may contain harmful additives.
   c. The cartridges are not childproof.

13. The Tobacco Action Committee of ATS recommends e-cigarettes be restricted or banned because:
   a. they are not an effective smoking cessation aid.
   b. there is not enough information about their safety.
   c. they are known to be just as dangerous as conventional cigarettes.

14. AHA's 2014 policy statement holds the position that e-cigarettes be included in the legal definition of "tobacco products" because e-cigarettes:
   a. contain tobacco.
   b. have similar long-term health consequences as other tobacco products.
   c. may be exempt from tobacco control laws if they have a separate definition.

15. What safety feature does the AHA policy statement recommend for all e-cigarette liquid containers?
   a. Child proof packaging
   b. Mechanism to prevent over-heating
   c. Filters

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