

Updates in Smoking Cessation: Maximizing Intervention Strategies in Clinical Practice



- Cardiovascular Morbidity and Mortality: Patients with CVD and Diabetes Need Help
- Smoking and Respiratory Disease
- Smoking and Cancer
- Barriers to Receiving Smoking Cessation Counseling in Primary Care
- Active-Duty Military and Veterans Have High Smoking Rates
- Tobacco Treatment Guidelines Are Available—But Are Underutilized
- Training Is Available
- Medical Therapies for Smoking Cessation
- Behavioral Approaches: Use of Quitlines, Apps, and Smartphones to Augment Smoking Cessation Interventions
- E-Cigarettes: Recent Controversies and Role in Smoking Cessation
- The Challenge Posed by Dual Users
- The Growing Health Crisis: E-Cigarettes and Vaping

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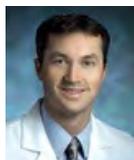
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Dear Colleague:

As a cardiologist, you often encounter patients who have experienced a recent cardiac event or newly discovered cardiovascular disease (CVD). A number of these patients smoke or use other tobacco products that put their CV health at risk. Others are long-standing patients who have been struggling to quit and may have tried unsuccessfully, sometimes a number of times. You know that tobacco use is a major risk factor for CV morbidity and mortality and even a low smoking burden can increase risk. Indeed, tobacco use:

- Exacerbates atherogenesis and thrombosis formation
- Increases risk of heart disease, acute coronary events, and CVD-related complications
- Is associated with adverse outcomes following revascularization

Your patients need to quit, and they need your help to do so. The key to is to recognize tobacco use as an addiction. Patients need counseling and guidance, referral to treatment centers or other forms of assistance, and pharmacologic intervention to achieve success in quitting. As a cardiologist, you face unique challenges when trying to get your patients to quit. It can be discouraging to see patients with CVD continue to smoke or relapse following a quit attempt. Becoming familiar with the guidelines, learning which cessation treatments work, offering compassionate and persistent counseling, and working with colleagues as a multidisciplinary team can help your patients quit for good.

This supplement provides a review of current guideline recommendations for tobacco cessation, particularly in high-risk populations with CVD. It offers guidance, best practices, and tools to assist you in helping your patients with CVD, and often other comorbidities, to quit using tobacco products. By reviewing recent clinical trial data, the supplement highlights current smoking cessation therapies that can be incorporated into a comprehensive, individualized treatment plan. Finally, the supplement addresses e-cigarettes, recent controversies related to their use, the current e-cigarette health crisis, and their use in smoking cessation. As a cardiologist, you have a unique opportunity to help your high-risk patients stop using tobacco and work collaboratively with you to take control of their lives.

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Target Audience

This activity has been designed to address the educational needs of clinicians involved in management of patients who smoke, including cardiologists, endocrinologists, internal medicine and family medicine physicians, clinicians working in the Federal health system, physician assistants (PAs), nurse practitioners (NPs), and nurses.

Learning Objectives

At the conclusion of this activity, participants should be better able to:

- Demonstrate an understanding of current guideline recommendations for smoking cessation in high-risk populations
- Identify an appropriate action plan for patients who use tobacco and have comorbid conditions
- Review current clinical trial data demonstrating the safety and efficacy of US Food and Drug Administration (FDA)-approved smoking cessation therapies to better individualize therapy for patients who use tobacco
- Discuss recent controversies regarding the use of e-cigarettes in smoking cessation

Statement of Educational Need

Tobacco is the leading preventable cause of disease, disability, and death in the US. Both combustible forms and e-cigarettes (“vaping”) pose a public health challenge, especially among younger people. In this timely review, experts assess the evidence for use of drug and nicotine-replacement treatments and debunk the myth that vaping is an effective strategy for tobacco cessation. The authors provide practical strategies for implementing tobacco cessation plans in various clinical settings to improve patient outcomes.

Clinicians need to improve their understanding of recommendations and strategies, as well as recent clinical evidence

related to FDA-approved therapies, to make informed treatment decisions that more effectively help their patients reduce or eliminate their use of tobacco and nicotine-containing products.

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Adam O. Goldstein, MD, has nothing to disclose.

Thomas J. Payne, PhD, NCTTP, has nothing to disclose.

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The message clinicians should deliver to their patients:
“The most important thing you can do for your health is to quit tobacco use. I (we) can help.”

—2019 ACC/AHA Guideline on the Primary Prevention of CVD¹

Introduction

Tobacco use is the leading preventable cause of disease, disability, and death in the United States.¹ Almost one-third of deaths due to coronary heart disease (CHD) are attributable to smoking and exposure to second-hand smoke.¹ Although smoking rates have declined in recent decades (Figure 1), in 2017, an estimated 47.4 million US adults (19.3%) still used a tobacco product, including combustible cigarettes; cigars, cigarillos, or filtered little cigars; electronic cigarettes (e-cigarettes); smokeless tobacco; and pipes, water pipes, or hookahs (Figure 2).² The American Heart Association (AHA) recognizes that nicotine is as addictive as cocaine or heroin, but tobacco users—and, unfortunately, many of the clinicians who care for them—fail to fully recognize that fact.³

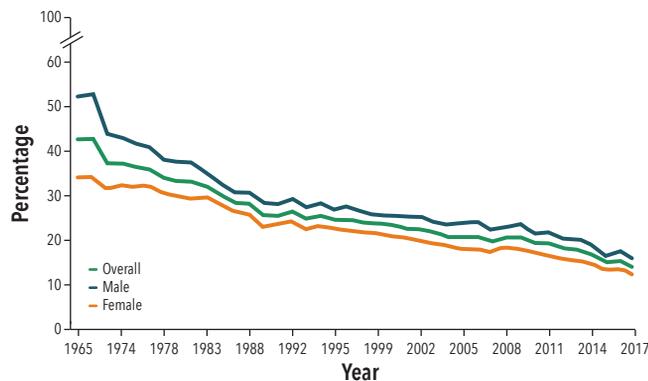
Many smokers do not receive smoking cessation counseling of any kind from their clinicians. A recent study investigated 10-year trends in cessation among adult smokers in the United States from 2006–2007 to the 2014–2015 time periods. The survey found that the percentage of patients who received physician counseling for smoking cessation increased modestly during that time from 60.2% to 64.9% ($P=0.0001$); women were more likely to receive counseling, while uninsured people were less likely.⁴ Interestingly, however, the use of prescription smoking cessation medications decreased during that time, and was lowest for males, racial minorities, and the uninsured.

The 2000–2015 National Health Interview Survey examined the impact of various factors on smoking quit rates in adults, including insurance status, provider advice to quit, and use of cessation counseling and/or medication. The analysis of the data revealed that disparities by insurance status persist.⁵ The authors concluded that making comprehensive, barrier-free cessation coverage available to all smokers would increase rates of smoking cessation.⁵

Virtually all smokers benefit from smoking/tobacco cessation programs, and such programs have been shown to be cost-effective.⁶ The Centers for Disease Control and Prevention (CDC) recognizes that comprehensive tobacco control programs need to focus on reducing disease, disability, and death related to tobacco use.⁷ In order to deliver successful cessation programs and counseling, it is imperative that clinicians caring for tobacco users understand the need for improved counseling and treatment to promote cessation.

This goal of this supplement are to review current data on the risks of tobacco (whether through use of combustible or electronic cigarettes); to explore the challenges of managing patients who smoke, including those with common comorbidities; and to provide evidence-based, real-world strategies for implementing smoking and tobacco cessation programs in clinical practice.

Figure 1. Smoking Rates Have Declined Since 1965

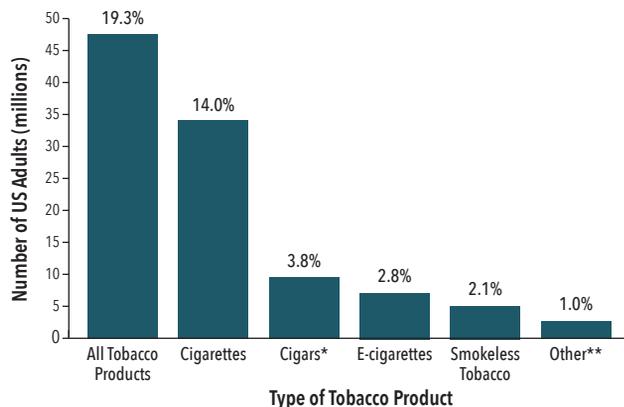


Percentage of adults aged ≥18 years who were current cigarette smokers,* overall and by sex — National Health Interview Survey (NHIS), United States, 1965–2017.

*For NHIS years 1965–1991, current smokers included adults reporting ≥100 cigarettes smoked in their lifetime and currently smoked. Since 1992, current smokers included adults who reported smoking ≥100 cigarettes during their lifetime and specified currently smoking every day or on some days. (Data are not available for 1967–1969, 1971–1973, 1975, 1981, 1982, 1984, 1986, 1989, and 1996 because questions regarding smoking were not included.)

Source: Wang et al.²

Figure 2. 2017 Estimated Use of Tobacco Products in the United States



*Includes cigars, cigarillos, and filtered little cigars.

**Includes pipes, water pipes, and hookahs.

Source: Wang et al.²

Goals for Comprehensive Tobacco Control Programs

- Prevent initiation among youth and young adults
- Promote quitting among adults and youth
- Eliminate exposure to secondhand smoke
- Identify and eliminate tobacco-related disparities among population groups

Source: Centers for Disease Control and Prevention.⁷

Cardiologists Face Challenges in Delivering Tobacco Cessation Therapy

- May be discouraged by patients who express ambivalence about quitting
- Misperceive when patients lack motivation to quit tobacco
- Become frustrated when patients relapse, often because they do not realize that relapse is common and expected in the quitting process
- May regard tobacco treatment to predominantly be the responsibility of primary care physicians

“Delivering tobacco cessation therapy is an important element of contemporary cardiology practice as it positively affects disease progression, improving outcomes in patients with CVD.”

—2018 ACC Expert Consensus Decision Pathway on Tobacco Cessation Treatment⁸



Cardiovascular Morbidity and Mortality: Patients with CVD and Diabetes Need Help

Smoking and tobacco use is a major risk factor for cardiovascular (CV) morbidity and mortality, particularly in patients with CV disease (CVD) or risk factors for CVD.⁸ Smoking worsens atherogenesis and thrombosis formation, increasing the risk of heart disease and acute coronary events, as well as other CV complications including heart failure and arrhythmias, stroke, peripheral artery disease (PAD), and abdominal aortic aneurysm.

Continued smoking following revascularization is clearly associated with adverse clinical outcomes; even low-level exposure to tobacco smoke (including secondhand smoke) is associated with increased CV risk.⁹ Importantly, even a low smoking burden has been associated with an increased risk of CHD and stroke.¹⁰ A recent meta-analysis of 55 publications containing 141 cohort studies showed that men who smoked only 1 cigarette/day had 46% of the excess relative risk (RR) for CHD compared with those who smoked 20 cigarettes/day, while women had 31% of the excess RR. For stroke, the excess RR was 41% for men and 34% for women. RRs were generally higher among women than men.

“Smoking only about 1 cigarette per day carries a risk of developing CHD and stroke much greater than expected: around half that for people who smoke 20 per day. No safe level of smoking exists for cardiovascular disease.”¹⁰

Smoking is also associated with the development of type 2 diabetes (T2D); smokers are 30% to 40% more likely to develop T2D than nonsmokers.¹¹ Furthermore, the more cigarettes smoked, the higher the risk of developing T2D.¹¹ In addition, patients with diabetes who smoke are more likely to have difficulty controlling their disease and have serious diabetes-related health problems compared with patients with diabetes who do not smoke.¹¹ Patients with diabetes who smoke are more likely to have serious diabetes-related health problems including heart and kidney disease; poor lower extremity circulation leading to infections, ulcers, and possible amputation; and retinopathy and peripheral neuropathy.¹¹ Dose-dependent risk—which takes into account the intensity of smoking (packs per day) and cumulative smoking (pack-years) as key variables—of CVD, heart failure, and stroke are also higher in

Patients Living With Diabetes Need to Stop Smoking

For these individuals, smoking:

- Negatively affects cardiometabolic control
 - Worse lipid profiles
 - Increased insulin resistance
 - Greater glycemic burden
 - Higher blood pressure and pulse rates
 - Elevated levels of proteinuria and uric acid
- Makes glycemic control more difficult
- Increases A1c levels
- Leads to greater microvascular complications
- Increases risk of nephropathy
- Contributes to sleep problems

Source: Maurer.¹⁴

patients with type 1 diabetes (T1D) who smoke compared with those who do not smoke.¹² Smoking has also been shown to increase the risk of microvascular complications in people with T1D and can negatively affect their ability to achieve glycemic control.¹³

Even in patients who quit smoking, the impact of their smoking can have lasting effects. The longitudinal Framingham Heart Study has investigated heart disease in individuals including their current smoking status since 1948.¹⁵ A recent analysis of the risk of CVD in former smokers demonstrated a significantly decreased risk within 5 years; however, former heavy smokers (>20 pack-year history) continued to have statistically greater CVD risk than never-smokers for 16 years after quitting.¹⁵ The Atherosclerosis Risk in Communities study looked at the association of smoking and smoking cessation with 3 markers of atherosclerosis in adults aged 45-64 years over a 30-year time span.¹⁶ This study found a dose-dependent increase in the incidence of PAD, CHD, and stroke for both heavy and long-term smokers. While the risk for these markers decreased within 5 years of quitting, when compared to never-smokers, the risk of PAD remained higher for more than 30 years and the risk for CAD remained higher for more than 20 years.¹⁶ These studies underscore the need for continued monitoring of previous smokers, even after they successfully quit smoking. This ongoing attention is especially warranted for patients with CVD and/or diabetes who represent a high-risk group that need to remain smoke-free.

While smokers are at particular risk for developing CVD, and patients with CVD and diabetes are at risk for worsening symptoms and disease course, a number of other populations would benefit from tobacco treatment. Patients with respiratory illnesses and cancer are dramatically affected by smoking. Pregnant women, hospitalized patients, adolescents, and people with mental health disorders and substance dependence would also benefit from interventions to assist in quitting smoking.



Smoking and Respiratory Disease

Smoking can cause or exacerbate respiratory conditions, including chronic obstructive lung disease (COPD), asthma, and respiratory infections, resulting in poor symptom control and increased morbidity.^{17,18} According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2020 Report, COPD is a leading cause of morbidity and mortality worldwide. The characteristics of COPD—namely, persistent respiratory symptoms and airflow limitation from airway and/or alveolar abnormalities—result from a “complex interplay of long-term cumulative exposure to noxious gases and particles, combined with a variety of host factors including genetics, airway hyper-responsiveness and poor lung growth during childhood.”¹⁸ While COPD is most often directly related to tobacco smoking, other forms of air pollution (outdoor, occupational, indoor) are also major risk factors worldwide.

As the authors of the GOLD 2020 Report note, “Smoking cessation has the greatest capacity to influence the natural history of COPD.”¹⁸ GOLD recommends that all individuals who smoke be strongly encouraged and supported to quit, stressing that healthcare providers play a pivotal role in the delivery of smoking cessation messages, interventions, and counseling. A key strategy is referral to a comprehensive smoking cessation program that incorporates behavioral interventions to enhance motivation and confidence, patient education, and pharmacologic and nonpharmacologic interventions.¹⁸ As emphasized in smoking cessation guidelines, smoking status should be assessed at each visit for patients with COPD. The Global Initiative for Asthma (GINA) also recommends smoking cessation in patients with asthma through the provision of advice and resources.¹⁷ A comprehensive discussion of cessation guidelines is presented below.



Smoking and Cancer

According to the American Cancer Society (ACS), a substantial number of cancers—including “all cancers caused by tobacco use and other unhealthy behaviors”—are preventable.¹⁹ Indeed, at least 42% of newly diagnosed cancers in the United States—about 740,000 cases in 2019—could potentially be avoided, including 19% of all cancers that are linked to smoking.¹⁹

People who smoke are 25 times more likely to develop lung cancer than nonsmokers. While the incidence of lung cancer has decreased in the last few decades due to smoking cessation efforts, an estimated 228,150 new cases will be diagnosed and an estimated 142,670 deaths from lung cancer will occur in the United States in 2019.¹⁹ “Cigarette smoking is by far the most important risk factor for lung cancer; 81% of lung cancer deaths in the United States are still caused by smoking.”¹⁹ Cigar and pipe smoking also increase the risk for lung cancer, as does exposure to radon gas, secondhand smoke, asbestos (particularly among smokers), certain metals (chromium, cadmium, arsenic), some organic chemicals, radiation, air pollution, and diesel exhaust. The American Cancer Society recommends annual screening for lung cancer with low-dose spiral computed tomography in adults 55 to 74 years of age, specifically when combined with smoking cessation counseling.¹⁹

The connection between smoking and lung cancer is well known, but smoking is also associated with many other forms of cancer.¹⁹ About half of kidney cancers could potentially be prevented by eliminating such strong risk factors as excess body weight and smoking. Smoking is also a risk factor for acute myeloid leukemia (AML); evidence shows that parental smoking before and after childbirth may increase the risk of AML in children. Approximately 70% of liver cancer cases in the United States could be prevented by managing smoking and other risk factors (excess body weight, T2D, chronic infection with hepatitis B virus and/or hepatitis C virus, heavy alcohol consumption). Cigarette smokers have about twice the risk of pancreatic cancer as never-smokers; the use of smokeless tobacco also increases risk. Tobacco smoking is also the most well-established risk factor for bladder cancer: Nearly half (47%) of all cases in the United States are linked to smoking. Finally, there is accumulating evidence that smoking increases the risk of fatal prostate cancer. Risk factors for cancer of the oral cavity and pharynx include infection with human papillomavirus (HPV), any form of tobacco use, and excessive alcohol consumption, with a synergistic relationship leading to a 30-fold increased risk for people who both smoke and drink heavily. While almost all cervical cancers are caused by persistent infection with certain types of HPV, these infections are common in healthy women and only rarely lead to cervical cancer; smoking is a risk factor contributing to the development of cervical cancer in HPV-infected women.¹⁹

Quitting smoking can have a positive effect on cancer outcomes.¹⁹⁻²¹ In addition, continued smoking by patients with cancer may increase the risk of first-line cancer treatment failure.²² This failure is associated with significant costs for subsequent cancer treatments and can increase morbidity and mortality in these patients. In light of the link between smoking and many types of cancer, the National Comprehensive Cancer Network (NCCN) has developed targeted guidelines to assist clinicians in helping their patients with cancer quit smoking.²¹



Barriers to Receiving Smoking Cessation Counseling in Primary Care

Primary care clinicians are on the frontline of efforts to promote smoking and tobacco cessation in large part because they coordinate care across the many organ systems affected by smoking and spend more time discussing disease prevention and lifestyle therapy than most specialists. Moreover, the fact that physicians can prescribe smoking cessation medications provides additional tools to help patients successfully quit smoking, and many primary care doctors are familiar with these therapies.²³

Clinicians are taking the importance of tobacco treatment to heart, and most clinicians now routinely ask about smoking and tobacco use during office visits. However, in some cases, clinicians fail to follow up their queries about tobacco use by providing patients with the ongoing support they need. The analysis from the 2012 National Ambulatory Medical Care Survey (NAMCS) reveals that, while smoking status was recorded 77.7% of the time in a primary care setting, smoking cessation counseling and medications were ordered only 9.1% and 2.1% of the time, respectively.²³ A recent study using electronic medical records (EMRs) from a primary care safety net clinic found that factors contributing to greater smoking cessation assistance included female gender, more office visits, readiness to quit smoking, comorbid asthma/COPD, and hyperlipidemia.²⁴ In contrast, factors leading to decreased smoking cessation counseling and medication included lack of insurance, race other than non-Hispanic white, diabetes, older age, and the presence of comorbidities.²⁴ The healthcare system needs to do a better job providing cessation assistance to its most vulnerable populations, particularly those at risk for CVD, lung and other cancers, and pulmonary disorders.

Rural populations, in particular, experience greater barriers to tobacco cessation than do those in nonrural settings; these patients are less likely to see a physician regularly and have less access to tobacco treatment programs.²⁵ Telephone “quitlines” can be helpful, but they appear to be less effective in rural communities,²⁶ and research on quitting smoking often does not examine the implementation of evidence-based tobacco cessation in these populations.²⁷

Ethnicity may also be a factor. A recent study investigated sociodemographic factors that influence receipt of counseling for low-income patients in a primary care setting.²⁸ Non-Hispanic whites had lower odds of receiving at least the minimum intervention compared with all other race or ethnicity categories, particularly those under the age of 50 years.²⁸

The presence of an EMR system equipped with automated clinical reminders led to increases in ordering tobacco cessation counseling or medications (16.4% and 3.7% of the time, respectively).²³ Although there is room for improvement, automated clinical reminders represent a valuable technology that should be incorporated into clinical practice, particularly in primary care where smoking cessation may help to prevent serious CVD complications.



Active-Duty Military and Veterans Have High Smoking Rates

Another group at high risk for smoking—and thus in need of targeted tobacco treatment efforts—includes military personnel, both active-duty and those within the Veterans Health Administration (VHA) system. Close to half of all military personnel smoke—a rate dramatically higher than that seen among the rest of the US population.^{29,30} Indeed, US soldiers are much more likely to smoke than civilians, due at least in part to the stress associated with deployments. Veterans with posttraumatic stress disorder and/or other mental illness also smoke at higher rates (as do civilians with psychiatric comorbidities), necessitating an integrated approach to smoking cessation and psychological management.³¹ Tobacco use is also more prevalent among veterans from Operation Enduring Freedom and Operation Iraqi Freedom than among the general veteran population.³² These veterans report a need to modulate negative moods, cope with the shift to civilian life, and deal with combat-related injuries, sleep disorders, and the inability to “turn off the [hypervigilant] military mindset.”³²

Tobacco cessation pharmacotherapy provided by the VHA has been shown to be cost-effective in a real-world setting.³³ Beyond offering evidence-based tobacco cessation interventions, strategies shown to improve cessation in this population include implementing tobacco-free policies at military installations and Veterans Affairs (VA) medical facilities; increasing age requirements to buy tobacco on military bases; and eliminating tobacco product discounts through military retailers.^{29,30} Although the use of smoking cessation pharmacotherapy by the VHA nearly doubled from approximately 14% in 2004 to almost 26% in 2013, reaching undertreated subgroups, particularly those with medical comorbidities, would further improve health outcomes.³⁴

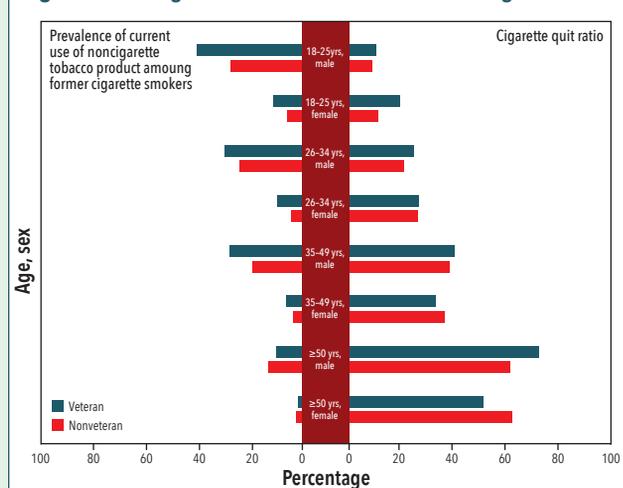
Challenges to Tobacco Cessation in VA Primary Care

- Higher rates of tobacco use in many veteran groups, including
 - Veterans of the Iraq and Afghanistan wars
 - Patients with mental health issues (including substance dependence)
 - HIV-infected patients
- Integrating tobacco cessation counseling into all patient care areas including primary care, mental health, and specialty clinics
- Changing the delivery of tobacco cessation services to address tobacco use and dependence in a chronic disease model

Source: US Department of Veterans Affairs.³¹

A survey of US soldiers deployed in 2008–2009 investigated correlations in smoking-related behaviors.³⁵ Daily smoking was seen in 47% of the soldiers; 17% of the soldiers were classified as heavy smokers, a behavior associated with combat exposure and aggression. Another study by the CDC found that, by age and sex subgroups, the use of any tobacco product is significantly higher among all veteran groups compared with their nonveteran counterparts.³⁰ In addition, the current use of a noncigarette tobacco product among former smokers is significantly different among veterans compared with nonveterans in males aged 35 to 49 years and males aged ≥50 years ($P<0.05$); cigarette quit ratios were also significantly different among veterans and nonveterans in females aged 18 to 25 years, males aged ≥50 years, and females aged ≥50 years ($P<0.05$) (Figure 3).³⁰ Importantly, the incidence of adverse health conditions caused by tobacco use is particularly high among veterans. Tobacco use reduces physical fitness and endurance and is associated with absenteeism, lost productivity, and great cost to the military and the VHA.²⁹

Figure 3. Noncigarette Tobacco Product Use Among Veterans



Prevalence of current (past 30-day) use of a noncigarette tobacco product* among former cigarette smokers and cigarette quit ratios† among military veterans and nonveterans‡ by age and sex.

—National Survey on Drug Use and Health, United States, 2010–2015

* Noncigarette tobacco product includes cigars, roll-your-own tobacco, pipes, and smokeless tobacco.

† Cigarette quit ratio calculated as proportion of former smokers (persons who smoked ≥100 cigarettes during lifetime and did not smoke in the past 12 months) among ever smokers (persons who smoked ≥100 cigarettes during lifetime).

‡ Veterans were individuals who reported having been in the US Armed Forces and currently separated or retired from reserves/active duty at the time of the survey (pooled n=13,140). Nonveterans were individuals who reported having never been in the US Armed Forces (pooled n=224,648).

Source: Odani et al.³⁰

Tobacco Treatment Guidelines Are Available—But Are Underutilized

While clinicians are aware of the health risks associated with tobacco use, few of them receive the training needed to provide the behavioral and pharmacologic treatments required to treat tobacco dependence.³⁶ Indeed, several studies demonstrate deficiencies in how clinicians provide cessation guidance and treatment. The recent Nationwide Adult Medicaid Consumer Assessment of Health Plans survey revealed that 1 out of 3 US adults receiving Medicaid are smokers.³⁷ Among Medicaid patients with a personal doctor, 77% reported that their doctor only “at least sometimes” recommended quitting smoking and offered cessation medications, and only about half of the patients reported receiving smoking cessation counseling.³⁷ In addition, while 90% of recently surveyed primary care physicians, surgeons, and pulmonologists (N=561) agreed that advising and assisting patients with smoking cessation is their responsibility, and most (86%) discuss cessation more than 75% of the time, only 65% of these clinicians actually assist their patients with smoking cessation more than 75% of the time.³⁸

A telephone interview study of patients in the Kaiser Permanente Northern California integrated healthcare system revealed that, while 80% said they received advice on quitting smoking from a clinician, only 54% were aware that smoking cessation medication (including nicotine replacement therapy [NRT]) was free, only 54% used such smoking cessation medication, and only 6% participated in counseling to facilitate quitting smoking.³⁹ Patient data from 11 primary care clinics in Wisconsin identified 15,000 smokers, of whom only 67% received invitations to a smoking cessation program.⁴⁰ Patients were more likely to receive an invitation to a smoking cessation program if they were older, white or black (ie, not Hispanic or Asian), and had a low-risk diagnosis. The study revealed that, even in primary care systems that promote robust adherence to clinical practice guidelines, the rate at which patients are invited to participate in smoking cessation programs is variable and suboptimal.⁴⁰

Three Key Strategies for Treating Tobacco Use

- Use a chronic disease management strategy
- Use the “5As” intervention: Ask, Advise, Assess, Assist, Arrange
- Provide counseling and interventions through a multidisciplinary, longitudinal care model

To improve this situation, guidelines have been developed to assist clinicians in their efforts to help patients quit smoking. Available guidelines provide recommendations on best practices for implementing tobacco treatment, and several medical therapies have been approved by the US Food and Drug Administration (FDA). Despite these resources, clinicians may not be helping their patients apply these strategies effectively, if indeed they use them at all.^{8,41} The 2008 US Public Health Service (USPHS) Clinical Practice Guideline for Treating Tobacco Use and Dependence provides an evidence-based brief cessation intervention model known as “5As”: Ask, Advise, Assess, Assist, Arrange (Table 1) and provides 10 key guideline recommendations for assisting patients with smoking cessation (Table 2).⁶ Brief interventions are most effective when working with generally healthy individuals who function fairly well but these interventions may be of less value when working with persons with psychiatric comorbidities that require more active interventions.

Table 1. The 5As Treatment Approach to Tobacco Cessation

- **Ask** every patient at every visit about tobacco use.
- **Advise** every tobacco-using patient to quit.
- **Assess** each tobacco-using patient's motivation to quit.
- **Assist** interested patients with their quit tobacco use attempt, and help those not interested by providing a motivational intervention.
- **Arrange** for follow-up services.

Source: Adapted from Fiore et al.⁶

Table 2. Ten Key Recommendations From the US Public Health Service Clinical Practice Guideline for Smoking Cessation**GOALS**

- **To support clinicians in providing effective tobacco dependence counseling and in strongly recommending medications to their patients who use tobacco.**
- **To support health systems, insurers, and purchasers in assisting clinicians to make these tools available to their patients.**

1	Tobacco dependence is a chronic disease requiring repeated intervention and multiple quit attempts. Treatments can significantly increase long-term abstinence.
2	It is essential that clinicians and healthcare delivery systems identify and document tobacco use status and treat every tobacco user seen in a healthcare setting.
3	Clinicians should encourage every patient willing to make a quit attempt to use counseling and approved medication treatments.
4	Brief tobacco dependence treatment is effective. Clinicians should offer every patient who uses tobacco at least the brief treatments that have been shown to be effective.
5	Individual, group, and telephone counseling are effective. Two demonstrated effective components of counseling should be used: practical counseling (problem-solving/skills training) and social support delivered as part of treatment.
6	Numerous effective medications are available for tobacco dependence. Use by all patients attempting to quit smoking should be encouraged—except when medically contraindicated or with specific populations where there is insufficient evidence of effectiveness. Certain combinations of these medications should also be considered.
7	Combining counseling and medication is more effective than use of either alone and should be recommended by clinicians.
8	Telephone quitline counseling is effective with diverse populations and has broad reach. Patients should be given access to quitlines and their use should be encouraged.
9	If a tobacco user is unwilling to make a quit attempt, clinicians should use motivational treatments to increase future quit attempts.
10	Tobacco dependence treatments are both clinically and highly cost effective. Providing coverage for these treatments increases quit rates. All insurance plans should include counseling and medications as covered benefits.

Source: Adapted from Fiore et al.⁶

Table 3. ACC/AHA Tobacco Treatment Recommendations for Primary Prevention of CVD

- All adults should be assessed at every healthcare visit for tobacco use and status should be recorded as a vital sign to facilitate tobacco cessation.
- To achieve abstinence, all adults who use tobacco should be firmly advised to quit.
- In adults who use tobacco, combining behavioral interventions with pharmacotherapy is recommended to maximize quit rates.
- In adults who use tobacco, recommend abstinence to reduce ASCVD risk.
- To facilitate cessation, it is reasonable to dedicate trained staff to tobacco treatment in every healthcare system.
- All adults and adolescents should be counseled to avoid secondhand smoke to reduce ASCVD risk.

ACC=American College of Cardiology; AHA=American Heart Association; ASCVD=atherosclerotic cardiovascular disease; CVD=cardiovascular disease.

Source: Adapted from Arnett et al.¹

Smoking and tobacco cessation is a key component of the new 2019 American College of Cardiology/American Heart Association (ACC/AHA) Guideline on the Primary Prevention of Cardiovascular Disease (Table 3).¹ Recognizing the dramatic impact that tobacco use has on the risk for CVD, the guideline includes information about treating tobacco use as a strategy for preventing CVD. As outlined in the 2008 USPHS guideline, 1 key recommendation is to consider tobacco use as a “vital sign” and to record this status in the health record at every healthcare visit.⁶ This approach is reaffirmed in the AHA guidelines.¹ Included in this assessment should be the use of multiple questions that address the issue from different angles, since many people who use tobacco do not report it to their clinicians. Other techniques that may be of value:

- Use clear, strong, and compassionate language that encourage patients to quit tobacco use
- Offer strategies tailored to a patient’s specific medical history and preferences
- Prescribe FDA-approved tobacco-cessation pharmacotherapy in combination with behavioral interventions, and plan to follow-up with ongoing patient interactions
- Refer for intensive counseling with continued supportive follow-up after discharge for hospitalized adults who use tobacco

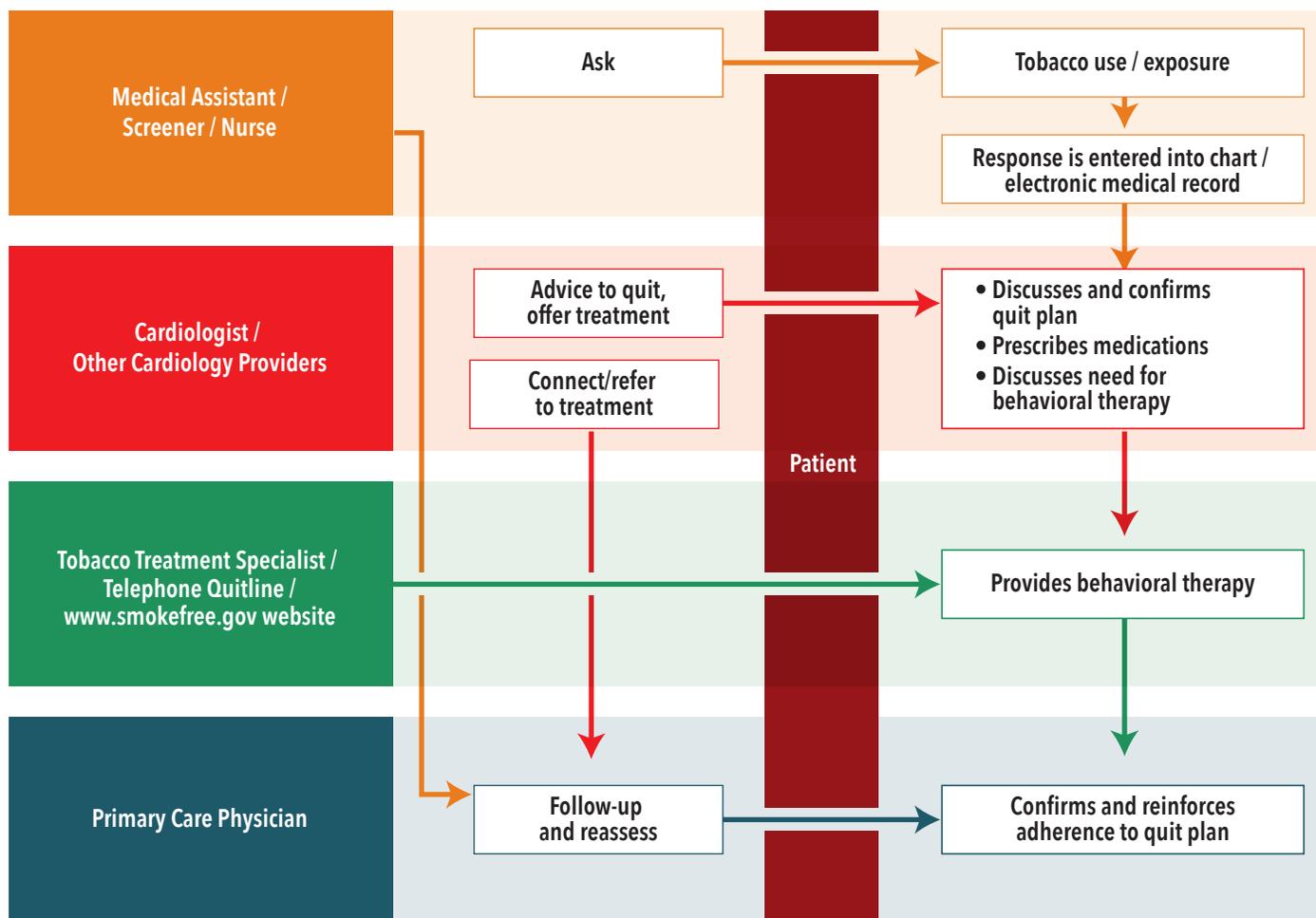
The 2018 ACC Expert Consensus Decision Pathway (ECDP) on Tobacco Cessation Treatment report was developed for cardiologists caring for patients with CVD⁸; however, the principles underlying this approach can be applied by clinicians of different specialties when managing their patients who use tobacco. The ACC regards cigarette

smoking as a chronic relapsing substance use disorder caused by addiction to nicotine, and that smokers often repeat cycles of short-term quitting.⁸ Accordingly, the ACC recommends that clinicians play an active role in offering every smoker cessation counseling and pharmacotherapy within the framework of a chronic disease management strategy.⁸ Providing interventions through an extended longitudinal care model improves patient tobacco abstinence and provides for better long-term smoking cessation results.⁴² The ACC ECDP builds on the “5As” concept⁶ by incorporating modifications reflecting newer evidence and changing patterns of practice, particularly in the CVD setting, with multiple members of the healthcare team playing an important role (Figure 4).⁸ The ACC ECDP also provides specific steps for patients who are former smokers or for those who indicate they are “not ready to quit.”⁸

Smoking cessation in patients with CVD requires a multi-disciplinary approach. Office staff, the cardiologist, a tobacco treatment specialist, and the primary care physician need to work together.

Primary care physicians play a key role within the ACC ECDP. Patients with CVD require a multidisciplinary team approach to help them quit and maintain a smoke-free life.

Figure 4. ACC Expert Consensus Simplified Workflow: Smoking Cessation for Outpatient Cardiology Care



Source: Barua et al.⁸

The 2018 ACC ECDP offers a comprehensive and structured approach to the evaluation and treatment of tobacco dependence in the cardiology care setting, providing guidance on overcoming challenges commonly encountered in clinical practice.⁴³ Modeled after methods used in caring for patients with other chronic diseases, the recommended strategy incorporates a team approach. In this strategy, multiple clinicians monitor tobacco use over time, provide repeated encouragement and assistance to quit, and offer a combination of pharmacotherapy with psychosocial interventions to address physiologic, cognitive-behavioral, and social aspects of tobacco dependence.⁸ This multidisciplinary team approach brings together physicians, nurses, pharmacists, psychologists, certified tobacco treatment specialists (where available), and health department quit smoking services.

Clinicians who feel more competent and who have support within their healthcare system are more likely to fully implement a 5As intervention with their tobacco-using patients.⁴⁴ A study published in 2017 found that patients who received smoking cessation intervention from their physicians (in this case, vascular surgeons) were more interested in stopping smoking and were more aware of the potential harm from smoking compared with patients who received usual smoking cessation care.⁴⁵ Clinician training and education improves their ability to provide office-based smoking cessation treatment and increases adherence to USPHS guidelines.⁴⁶ Both the 2018 ACC ECDP and the 2019 ACC/AHA guidelines stress that dependence on tobacco is a chronic, relapsing substance abuse disease requiring highly skilled chronic disease management.^{1,8}



Training Is Available

The ACC/AHA endorses the training of clinicians as a tobacco treatment specialist (TTS), describing them as health care professionals “who possess the skills, knowledge, and training to provide effective, evidence-based interventions for tobacco dependence across a range of intensities.”¹ Accredited TTS program descriptions and training schedules are available at the Council for Tobacco Treatment Training Programs (CTTTP) website (ctttp.org/accredited-programs).

The Association for the Treatment of Tobacco Use and Dependence (ATTUD) has developed a set of core competencies, which all TTSs should be familiar with and demonstrate competence (Table 4). Incorporation of these skill sets is required for CTTTP accreditation of each TTS curriculum.⁴⁷ The ATTUD Core Competencies also provide a foundation for developing a uniform, national tobacco treatment credential by focusing on awareness, knowledge, and proficiency similar to the credentialing process for other specialties such as certified diabetes educator, certified asthma educator, and certified health education specialist.⁴⁸ Currently, individuals completing a CTTTP-accredited TTS training program are eligible to apply for the National Certificate in Tobacco Treatment Practice (NCTTP), developed and supported in a joint venture by the ATTUD, the CTTTP, and the NAADAC (the Association for Addiction Professionals). It is fully expected that this national certificate program will be transformed into a national certification credential in 2020.

“Healthcare professionals who receive training in tobacco treatment are more likely to ask about tobacco use, offer advice to quit, provide behavioral interventions, follow up with individuals, and increase the number of tobacco users who quit.”

—2019 ACC/AHA Guideline on the Primary Prevention of CVD¹

“Behavioral treatments work best when combined with pharmacological smoking cessation treatments and delivered by trained tobacco treatment specialists over multiple face-to-face and/or phone sessions with smokers.”

—2018 ACC Expert Consensus Decision Pathway on Tobacco Cessation Treatment⁸

Table 4. ATTUD Core Competencies for Tobacco Treatment Specialists

1	Tobacco Dependence Knowledge and Education	Provide clear and accurate information about tobacco use, strategies for quitting, the scope of the health impact on the population, the causes and consequences of tobacco use
2	Counseling Skills	Demonstrate effective application of counseling theories and strategies to establish a collaborative relationship, and to facilitate client involvement in treatment and commitment to change
3	Assessment Interview	Conduct an assessment interview to obtain comprehensive and accurate data needed for treatment planning
4	Treatment Planning	Demonstrate the ability to develop an individualized treatment plan using evidence-based treatment strategies
5	Pharmacotherapy	Provide clear and accurate information about pharmacotherapy options available and their therapeutic use
6	Relapse Prevention	Offer methods to reduce relapse and provide ongoing support for tobacco-dependent persons
7	Diversity and Specific Health Issues	Demonstrate competence in working with population subgroups and those who have specific health issues
8	Documentation and Evaluation	Describe and use methods for tracking individual progress, record keeping, program documentation, outcome measurement and reporting
9	Professional Resources	Utilize resources available for client support and for professional education or consultation
10	Law and Ethics	Consistently use a code of ethics and adhere to government regulations specific to the health care or work site setting
11	Professional Development	Assume responsibility for continued professional development and contributing to the development of others

ATTUD=Association for the Treatment of Tobacco Use and Dependence.

Source: Reproduced from ATTUD website.⁴⁷



Medical Therapies for Smoking Cessation

Current FDA-Approved Agents:

Varenicline, Bupropion, NRT

Seven agents are currently FDA-approved for use in smoking cessation: bupropion, varenicline, and 5 forms of NRT—gum, inhaler, lozenge, nasal spray, and patch.^{6,8}

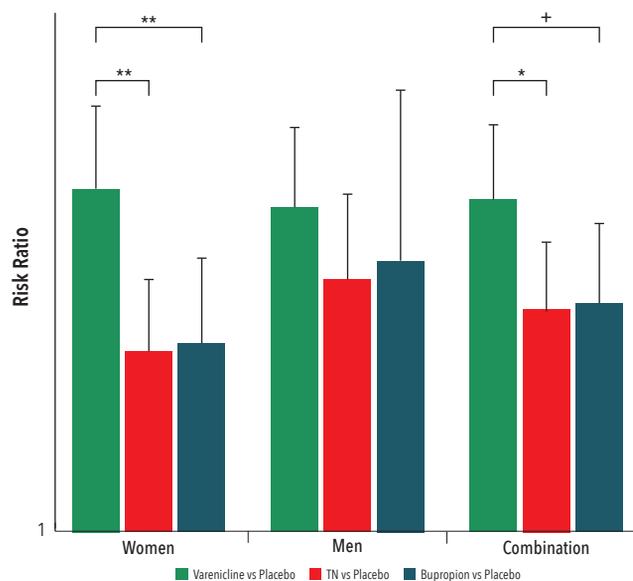
All these pharmacologic agents have been found to be highly effective. Recently, one Cochrane Database Systemic Review suggested varenicline may be the most effective agent for smoking cessation; the pooled RR for smoking abstinence for varenicline compared with placebo was 2.24, compared with bupropion (1.39) and NRT (1.25).⁴⁹

Another recent Cochrane review found that reduction-to-quit methods and abrupt quitting resulted in similar quit smoking rates.⁵⁰ The analysis found moderate-quality evidence suggesting that reduction-to-quit smoking may be more successful when combined with fast-acting NRT or varenicline. A real-world, long-term study that followed quitters every 6 months for up to 3 years analyzed the use of smoking cessation aids at the time of initial report of a quit attempt.⁵¹ Data showed that use of either the nicotine patch or varenicline was associated with lower rates of smoking relapse; no positive effect was observed for bupropion or nicotine gum. However, the effectiveness of the nicotine patch was reversed after the first month of tobacco abstinence.⁵¹ Another meta-analysis revealed that smoking cessation rates are higher with varenicline use, while transdermal nicotine and bupropion had similar efficacy (although lower than varenicline).⁵² Women were more likely to quit smoking when treated with varenicline compared with NRT or bupropion, whereas each of the 3 agents was similarly effective in men (Figure 5).⁵²

Varenicline previously had a public health advisory (issued in 2008) and a black box warning from the FDA (issued in 2009) cautioning about potential suicidal thoughts, aggression, and erratic behavior.⁵³ In 2016, however, the Evaluating Adverse Events in a Global Smoking Cessation Study (EAGLES) alleviated those concerns, showing that smoking cessation pharmacotherapies are safe and effective in patients with psychiatric disorders.⁵⁴ EAGLES was a double-blind, randomized, placebo-controlled study in which smokers with established psychiatric diagnoses (eg, depression, anxiety disorders, psychotic disorders, personality disorders) and nonpsychiatric controls received varenicline, bupropion, NRT, or placebo

for 12 weeks. Findings indicated that, for weeks 9 to 12, continuous tobacco abstinence rates were 33.5%, 22.6%, 23.4%, and 12.5%, respectively.⁵⁴ In secondary analyses of safety and efficacy outcomes by psychiatric diagnosis, varenicline, bupropion, and the nicotine patch were all well tolerated and found to be effective in adults with psychotic, anxiety, and mood disorders. The relative efficacy of varenicline, bupropion, and NRT versus placebo did not vary across psychiatric diagnoses.⁵⁵ The analysis of VHA and Medicaid data looked at prescribing records for varenicline over this time. Following the release of the 2008 and 2009 public health advisories, prescriptions for varenicline decreased; however, after the release of the EAGLES findings, varenicline prescriptions returned to former levels.⁵³

Figure 5. Cochrane Tobacco Addiction Group Network: Meta-Analysis of Smoking Cessation Pharmacotherapy



TN=Transdermal nicotine.
 Placebo comparison effect sizes (95% CI), with differences in effect size by medication.
 + $P<0.10$; * $P<0.05$; ** $P<0.01$.
 Source: Reproduced from Smith et al.⁵²

Table 5. ACC-Recommended Therapy for Tobacco Cessation in Patients with CVD

	Outpatient with stable CVD	Inpatient with ACS
First-Line Therapy	Varenicline OR combination NRT*	In-hospital to relieve nicotine withdrawal: Nicotine patch OR combination NRT* At discharge: Combination NRT OR varenicline†
Second-Line Therapy	Bupropion OR single NRT product	At discharge: Single NRT product
Third-Line Therapy	Nortriptyline‡	Bupropion§
If single agent is insufficient to achieve tobacco abstinence	Combine categories of FDA-approved drugs: • Varenicline + NRT (single agent) • Varenicline + bupropion • Bupropion + NRT (single agent)	(Not applicable)

ACC=American College of Cardiology; ACS=acute coronary syndrome; CVD=cardiovascular disease; NRT=nicotine replacement therapy.

*Combination NRT comprises a nicotine patch plus patient's choice of nicotine gum or lozenge or inhaler or spray.

†Some committee members planning to use varenicline would start in-hospital; others would not start until discharge. Regardless, continue nicotine patch or short-acting form of other NRT for 1 week to manage nicotine withdrawal symptoms during up-titration of varenicline dose.

‡Nortriptyline is not FDA-approved for smoking cessation; there are few data on its use in patients with CVD.

§Bupropion is third-line therapy because no evidence of efficacy when started during hospitalization for ACS or acute myocardial infarction. However, there are no special safety concerns for bupropion in this setting.

Source: American College of Cardiology Clinician Tool.⁴⁹

Pharmacologic Cessation Treatments Are Not Associated With Increased CV Risk

To evaluate the safety of pharmacologic treatments for smoking cessation, a follow-up to EAGLES assessed data looking for the development of a major adverse CV event (MACE)—CV death, nonfatal myocardial infarction, or nonfatal stroke—during treatment, as well as other pertinent CV events (MACE+; MACE or new-onset or worsening peripheral vascular disease requiring intervention, coronary revascularization, or hospitalization for unstable angina).⁵⁶ The incidence of such events during treatment for smoking cessation and follow-up was low (<0.5% for MACE; <0.8% for MACE+) and did not differ significantly by treatment. Thus, the use of varenicline, bupropion or NRT for smoking cessation was determined not to be associated with serious CV adverse events during or after treatment.

Pharmacologic Cessation in High-Risk Patients With CVD and/or Diabetes

Smoking cessation aids are also effective in high-risk populations. A meta-analysis found that the use of varenicline or bupropion resulted in greater smoking cessation rates at 6 and 12 months in smokers with CVD compared with placebo.⁵⁷ Telephone therapy and individual counseling for smoking cessation were also effective, while in-hospital behavioral interventions were not. Findings were inconclusive for NRT.⁵⁷ Furthermore, a pooled analysis of 15 clinical trials (N=6771) revealed that, in patients with diabetes (n=323), tobacco abstinence rates were higher with the use of varenicline compared with placebo at weeks 9 to 12: 43.8% vs 24.8% (odds ratio [OR]=2.36, 95% confidence interval [CI]=1.47–3.79); weeks 9 to 24: 27.5% vs 14.4% (OR=2.25, 95% CI=1.27–4.00); and weeks 9 to 52: 18.4% vs 10.1% (OR=2.00, 95% CI=0.90–4.49). Rates of the most common adverse events in patients with diabetes for varenicline vs placebo were nausea (27.2% vs 8.1%), headache (9.3% vs 9.9%), and insomnia (8.6% vs 5.6%); these rates—as well as the rates for weight gain—were similar in patients with and those without diabetes.⁵⁸ ACC-recommended pharmacotherapy for patients with CVD (both outpatient and in-hospital) is provided in **Table 5** on page 11.⁸ It is important for all physicians within the multidisciplinary care team to be familiar with recommendations for treating their high-risk patients and to work together to incorporate these methods into the care pathways for these vulnerable patient groups.

Combination Therapy

Combination pharmacologic therapy has also met with some success. Recent studies have examined the use of combination NRT (more than 1 NRT modality, such as a nicotine patch plus a short-acting gum, lozenge, or inhaler) or simultaneous use of varenicline and bupropion. A 2019 Cochrane review shows that smokers who use a combination of NRTs are more likely to successfully quit smoking than people who use a single NRT.⁵⁹ The review investigated factors that influence the success of NRT in smoking cessation by analyzing 63 trials with more than 41,500 participants. High-certainty evidence supports the use of combination fast-acting lozenges with nicotine patch over single-acting NRT; maximal benefit may be achieved by highly dependent smokers.⁵⁹

The combination of varenicline plus bupropion has demonstrated greater efficacy than varenicline monotherapy in 2 randomized clinical trials and 1 retrospective outcomes study.⁶⁰ Subgroup analyses suggest that the combination may be more beneficial in men and in patients with higher baseline nicotine dependence. Another study of male smokers with a high baseline nicotine dependence who smoke >20 cigarettes per day showed a greater tobacco abstinence rate with the combination of varenicline plus bupropion compared with varenicline alone.⁶¹ Improved outcome was not observed in smokers with a low level of dependence.⁶¹ Interestingly, patients who did not respond to NRT achieved better results with combination treatment compared with patients who responded to the patch.⁵⁶

The ongoing Medication Aids for Tobacco Cessation Health (MATCH) study is assessing the use and effectiveness of varenicline plus bupropion for long-term smoking cessation in a real-world setting.⁶² Such clinical trial data make it clear that clinicians caring for patients who use tobacco need to understand new and emerging data on various treatment strategies in order to tailor tobacco treatment options for optimal results.



Behavioral Approaches: Use of Quitlines, Apps, and Smartphones to Augment Smoking Cessation Interventions

Personal interaction with patients including counseling and behavioral approaches, combined with the use of medications for smoking and tobacco cessation, are effective in getting patients to quit. Referral to smoking cessation programs is also beneficial in helping patients to stop smoking and maintain tobacco abstinence.^{63,64} Modern technology can also be deployed to support these in-person interactions (eg, counseling, behavioral methods, discussions with clinicians) and can play an important role in helping patients quit smoking.

Quitlines have been incorporated into many state-based efforts to assist smokers and have shown some success. Cessation outcomes were analyzed 7 months after patients initially enrolled in a 2012 quitline program called Tips from Former Smokers (Tips) campaign in 3 states.⁶⁵ Lower nicotine dependence and higher call completion were associated with increased odds of 7-day and 30-day tobacco abstinence rates. Hospitalized patients can benefit from referral to quitlines following discharge if they are also provided with medications and follow-up.^{66,67} Predictors of quitting in patients who desired to quit smoking following hospital discharge include having received medication in the hospital or a prescription upon discharge. Successful quitting is associated with the total number of quitline calls and the use of pharmacotherapy for smoking cessation after discharge. Another recent trial showed that among patients enrolled in a quitline for smoking cessation, more quitline calls were received from patients who experienced higher transition of care ratings (those experiencing better coordination and continuity of healthcare when moving from 1 healthcare setting to either another or to home), in older patients, and in patients using smoking cessation medication postdischarge.⁶⁸ Increased quitline enrollment for smoking cessation was seen among patients of increased age, those who smoked within 30 minutes of waking (indicative of higher nicotine dependence), and those who expressed interest in quitting.⁶⁹ Quitlines for smoking cessation can help reach large numbers of people, but combining quitline support with pharmacotherapy is more likely to help patients cease tobacco use.

One study found that smokers were more likely to achieve continuous tobacco abstinence by using an interactive smartphone app, compared with a “static” app, at 1 month (28.5% vs 16.9%), 3 months (23.8% vs 10.2%), and 6 months (10.2% vs 4.8%), respectively.⁷⁰ A decision aid iPad app was used in primary care offices while patients waited for the physician in the exam room.⁷¹ This app increased the amount of time patients and physicians spent discussing smoking cessation and raised the likelihood that a smoking cessation decision would be made during the visit.

Providing patients with text message reminders combined with voice phone calls from clinicians and staff may be another useful strategy. In a recent clinical trial, current cigarette smokers in socioeconomically disadvantaged neighborhoods were randomized to receive NRT via transdermal patch, NRT plus text messaging, or NRT plus text messaging plus proactive counseling via mobile phone.⁷² Tobacco abstinence rates as measured through biochemical saliva verification were 12.0% for both NRT and for NRT plus text messaging; the rate more than doubled (25.5%) among patients given NRT plus text messaging plus phone calls.

Technology combined with proactive contact and involvement by healthcare providers will certainly play a greater role in promoting tobacco cessation over the next 5 to 10 years.

Electronic Nicotine Delivery Systems Are Not Recommended to Treat Tobacco Use

- E-cigarettes emit aerosol containing fine and ultrafine particulates, nicotine, and other toxic constituents
- E-cigarettes are associated with an increased risk of CV and pulmonary diseases
- Chronic use of e-cigarettes leads to increased oxidative stress and sympathetic stimulation

Source: ACC/AHA Guideline on the Primary Prevention of CVD.¹



E-Cigarettes: Recent Controversies and Role in Smoking Cessation

The use of e-cigarettes and other vaping devices has risen sharply in recent years, notably among smokers age 21 years and under. The 2016 Behavioral Risk Factor Surveillance System, a large US-based survey, revealed that e-cigarettes have a use prevalence of 4.5%; the highest use is among younger adults (aged 18 to 24 years).⁷³ The use of e-cigarettes was also high among men, among the LGBT community, in current cigarette smokers, and in those with chronic health conditions. Of interest, 15% of e-cigarette users are “sole users,” meaning they have never smoked combustible cigarettes. Sole e-cigarette use is on the rise and represents a grave public health concern. The use of e-cigarettes in adolescents has also been linked to eventual use of cigarettes.^{74,75} Misleading pro-vaping messages conveyed via social media promote e-cigarettes as safer than combustibles, as a useful smoking cessation aid, and as convenient to use where smoking is prohibited.⁷⁶ Unfortunately, until recently, public health and government agencies have been ineffective in providing accurate information that effectively combats these messages.

Clinicians need to be up to date on available and emerging evidence addressing risks and benefits associated with this noncombustible form of nicotine delivery if they expect to manage the health care of their patients effectively. In a recent survey of primary care physicians, surgeons, and pulmonologists, 67% reported that their patients ask them about e-cigarettes at least some of the time; 58% said that they ask their patients about e-cigarette use at least some of the time; 38% reported recommending e-cigarettes at some point to their patients who smoke, and 12% said they recommend them at least 25% of the time.³⁸ Indeed, interviews with physicians in 2016 revealed that most physicians discuss e-cigarettes with their patients (a conversation usually initiated by the patients).⁷⁷ Though physicians generally believe (accurately) that data are lacking regarding the safety and efficacy of e-cigarettes, most of them did not discourage their use as a smoking cessation aid; however, most clinicians report that they still preferred traditional smoking cessation methods over vaping as a strategy.⁷⁷ A recent review of literature from January 1990 through September 2018 assessed 13 studies related to the use of e-cigarettes and other electronic vaping devices used as a method to reduce tobacco use.⁷⁸ The majority of reviewed studies were carried out in the United States, and all the studies were longitudinal cohort studies. The analysis found that e-cigarette use was not significantly associated with increased smoking cessation among cigarette smokers. Given the rapid pace at which evidence is emerging in this area, more current studies are needed to document whether trends in clinicians’ understanding of e-cigarette use for smoking cessation are stable or changing.

Evidence is mounting that e-cigarettes are not a fully safe alternative to combustible tobacco. The use of these devices may damage blood vessels, and preliminary results from a new study indicate possible CV risks, although definitive evidence is lacking and study is ongoing.^{79,80} A recent cross-sectional analysis of the Population Assessment of Tobacco and Health survey assessed a potential association between e-cigarette use and having had a myocardial infarction.⁸¹ The longitudinal analysis found that some-day and every-day e-cigarette use is associated with an increased risk of having had a myocardial infarction (adjusted for combustible cigarette smoking).⁸¹

In addition, a cross-sectional analysis of the National Health Interview Survey (NHIS) data from 2014 (n=36,697), 2016 (n=33,028), and 2017 (n=26,742) assessed outcomes for e-cigarette users vs nonusers and smokers vs nonsmokers including myocardial infarction, hypertension, diabetes, depression/anxiety/emotional problems, circulatory problems, and stroke.⁸² Compared with nonusers, e-cigarette users had higher odds of having myocardial infarction (OR=1.558, 95% CI=1.447, 1.678; $P<0.0001$), stroke (OR=1.297, 95% CI=1.201, 1.400; $P<0.0001$), depression/anxiety/emotional problems (OR=2.200, 95% CI=2.063,

2.347; $P<0.0001$), and circulatory problems (OR=1.436, 95% CI=1.251, 1.648; $P<0.0001$). Interestingly, e-cigarette users had lower odds of having diabetes, and there was no significant difference between the 2 groups on the odds of hypertension (OR=0.971, 95% CI=0.942, 1.001; $P=0.059$).⁸² Nicotine-containing liquids used in vaping devices can also lead to endothelial dysfunction, which is often associated with CVD.⁸³ E-cigarette aerosol also promotes faster metabolism of tobacco carcinogens to genotoxic metabolites in a human oral keratinocyte cell line.⁸⁴ Two new studies also show that e-cigarettes contain cancer-causing chemicals.⁷⁵

E-cigarettes have recently been associated with pulmonary disorders, including chronic bronchitis, emphysema, and COPD. Analysis of 2016-2017 data from the Behavioral Risk Factor Surveillance System, involving more than 700,000 participants, found a significantly higher odds of these pulmonary disorders among current e-cigarette users compared with those who have never used e-cigarettes. These associations were significant across all categories of combustible cigarette smoking, including those who had never smoked combustible cigarettes. Among never combustible cigarette smokers, daily users of e-cigarettes had the highest odds of COPD compared to never e-cigarette users.⁸⁵

A majority of e-cigarette users reported at least 1 negative symptom associated with the use of these devices, most commonly cough or dry/irritated mouth or throat.⁸⁶ A recent study among people who never smoked tobacco also showed that e-cigarette use is associated with asthma in a dose-dependent fashion.⁸⁷ Current news reports frequently describe the serious—and potentially fatal—lung damage caused by ingredients found in some vaping materials (see sidebar on The Growing Health Crisis: E-Cigarettes and Vaping).

Clinicians who recommend the use of e-cigarettes as a primary strategy for smoking cessation are advised to reconsider that position. One good sign of progress in this direction is that 2 recent surveys—Tobacco Products and Risk Perceptions Surveys (TPRPS) and Health Information National Trends Surveys Changing Perceptions of Harm of e-Cigarette vs Cigarette Use (HINTS)—reveal that the percentage of adults who believe that e-cigarettes are safer than combustible cigarettes decreased between 2012 and 2017, while the percentage who believe that e-cigarettes are equally or more harmful has increased.⁸⁸ Another recent survey has replicated a considerable body of literature revealing that smokers who attempted to quit using e-cigarettes were less likely to report being smoke-free 30 days prior to 1-year follow-up than were those who did not use e-cigarettes.⁸⁹

“The likelihood that the use of e-cigarettes drives a net public health gain remains uncertain. Moreover, it is unclear whether the marginal potential of e-cigarettes to reduce harm in current smokers justifies the recruitment of a whole new generation to nicotine and tobacco addiction.”

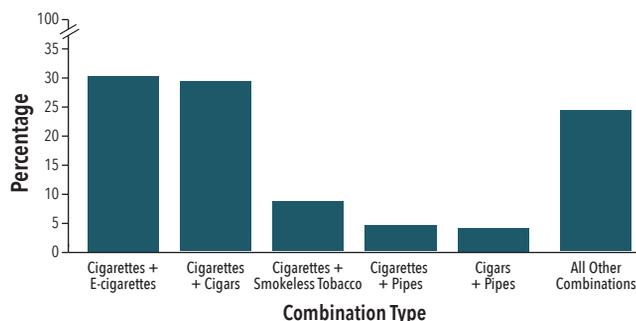
—Bhatnagar et al.⁹⁰

While people who use e-cigarettes may find it easier to quit,⁹¹ relapse from quitting may be more pronounced in e-cigarette users. The recent Population Assessment of Tobacco and Health (PATH) US survey investigated the effects of e-cigarette use in former smokers.⁹² For short-term quitters (<1 year), the relapse rate was 31.6% for those who never used e-cigarettes, 39.0% for those with prior e-cigarette use, 51.6% for occasional e-cigarette users, and 31.9% for daily e-cigarette users. For long-term quitters (>1 year), the respective relapse rates were 1.8%, 10.4%, 9.6%, and 15.0%.⁹² Thus, relapse from smoking cessation is more common among quitters with prior or current regular e-cigarette use.⁹² Indeed, the PATH survey also revealed that users of e-cigarettes in the past 30 days were more likely than those that never used e-cigarettes to report the use of combustible cigarettes at a 1-year follow-up.⁹³ The use of e-cigarettes to reduce potential harm in current smokers does outweigh the challenge of generating new users to become addicted to nicotine, particularly adolescents who are attracted to e-cigarettes as a falsely safe alternative.⁹⁰

The Challenge Posed by Dual Users

Many people in the United States are dual users of tobacco products (Figure 6),² posing a unique challenge to healthcare providers. Data from the Behavioral Risk Factor Surveillance System, a large nationally representative cross-sectional telephone survey, included 12,908 (2.9%) dual users (that is, those who use both e-cigarettes plus combustible cigarettes).⁹⁴ While there was no difference in CVD rates between those who used e-cigarettes only and those who never smoked, dual users of e-cigarettes plus combustible cigarettes had a 36% higher risk of CVD (OR=1.36; 95% CI=1.18–1.56) compared with current combustible-cigarette smokers who never used e-cigarettes. These preliminary findings support the critical need to explore CVD risk associated with e-cigarette use, particularly among dual users.⁹⁴

Figure 6. Dual Usage of Tobacco Products



Top tobacco product use* combinations among adults aged ≥18 years who currently used ≥2 tobacco products†§

—National Health Interview Survey, United States, 2017*

*For cigarettes, current smokers were defined as persons who had smoked ≥100 cigarettes during their lifetime and now smoked either every day or some days. Current users of all other assessed tobacco products were defined as persons who reported the use of each respective product every day or some days at the time of survey.

†Percentages were calculated among adults who currently used ≥2 of the following 5 tobacco product types: cigarettes; cigars, cigarillos, or filtered little cigars (cigars); regular pipes, water pipes, or hookahs (pipes); chewing tobacco, snuff, dip, snus, or dissolvable tobacco (smokeless tobacco); and electronic cigarettes (e-cigarettes).

§A total of 26 distinct combinations were assessed (10 two-product type combinations; 10 three-product type combinations; 5 four-product type combinations, and 1 five-product type combination).

Source: Reproduced from Wang et al.²

The Growing Health Crisis: E-Cigarettes and Vaping

The CDC, the FDA, state and local health departments, and public health and clinical partners are investigating a multistate outbreak of lung injury associated e-cigarette/vaping-associated lung injury (EVALI).^{95,96} As of December 4, 2019, 2991 EVALI cases had been reported to the CDC from every US state, the District of Columbia, and 2 US territories (Puerto Rico and US Virgin Islands), with 48 deaths confirmed in 25 states and the District of Columbia. While tetrahydrocannabinol (THC) has been shown to be present in most of the samples tested by the FDA to date and most patients report a history of using THC-containing products, as of this writing (December 2019) the precise cause of these lung injuries (ie, from cannabis or tobacco) is not yet known. However, recent CDC laboratory testing of bronchoalveolar lavage fluid samples from 29 patients with EVALI from 10 states found vitamin E acetate (an additive used in production of e-cigarette or vaping products) in all of the samples; THC was identified in 82% of the samples, and nicotine was identified in 62% of the samples.⁹⁵ According to the CDC, “This is the first time that we have detected a potential chemical of concern in biologic samples from patients with these lung injuries.... While it appears that vitamin E acetate is associated with EVALI, evidence is not yet sufficient to rule out the contribution of other chemicals of concern to EVALI.”⁹⁵

The CDC continues to recommend abstinence from e-cigarette or vaping products that contain THC, as well as advising that people (1) not buy any type of e-cigarette or vaping products, particularly those containing THC, off the street and (2) not modify or add any substances to e-cigarette or vaping products. The CDC has activated an Emergency Operations Center to coordinate activities and provide assistance to states, public health partners, and clinicians around the nation. Data and information regarding the current crisis are consistently being updated and are available at www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html.

Clinicians need to persist in efforts to provide evidence-based treatments.

—2008 USPHS Clinical Practice Guideline for Treating Tobacco Use and Dependence⁶

CDC Advice for Healthcare Providers Evaluating Patients Suspected to Have EVALI⁹⁶

- All healthcare providers should ask about the use of e-cigarette or vaping products in a nonjudgmental and thorough manner
- Patients suspected to have EVALI should have a chest radiograph
- Hospital admission is recommended for patients with blood oxygen saturation (<95%) on room air or who are in respiratory distress
- Empiric use of a combination of antibiotics, antivirals, or steroids should be considered
- Tobacco product cessation strategies are recommended to help patients discontinue use
- Patients who have been treated for EVALI should not use e-cigarette or vaping products
- Persons should not use e-cigarette or vaping products containing THC
- Persons should refrain from all e-cigarette or vaping products containing nicotine
- E-cigarette or vaping products should never be used by youths, young adults, or pregnant women
- Persons who do not currently use tobacco products should not start using e-cigarette or vaping products

EVALI=e-cigarette/vaping-associated lung injury; THC=tetrahydrocannabinol.

Conclusion

Smoking and tobacco use represent an ongoing healthcare challenge for both patients and the clinicians who care for them. Providing smoking cessation counseling and tools for successful quitting must recognize and underscore the chronic and often relapsing nature of tobacco dependence.⁶ The use of the approach known as 5As—Ask, Advise, Assess, Assist, Arrange—is a key component in the fight to get patients to quit smoking; clinicians should incorporate this strategy into their everyday practice.

Specific attention should be paid to promote smoking cessation among at-risk populations, including those with CVD, diabetes, veterans, and low-income and rural populations. Efforts must be made to counteract the popular misconception, prevalent among adolescents, that e-cigarettes provide a fully safe alternative to combustible tobacco products and that they are an effective long-term strategy for promoting sustained quitting. Currently available e-cigarettes are not yet subject to FDA regulation.

Clinicians should consider tobacco use status as a vital sign to be noted at every patient visit and should explore ways to include trained tobacco specialists as members of the staff in their healthcare systems. Numerous resources to support these and other smoking/tobacco cessation efforts are available for both healthcare providers and patients. Thoroughly studied and effective FDA-approved cessation medications are available and should be recommended in appropriately selected patients. Combinations of these agents, the use of medications in combination with aggressive supportive and ongoing counseling, and the use of supportive technologies such as apps and text reminders may offer the best chances for successful cessation from smoking and other tobacco products.

Resources

Guidelines and Recommendations

US Public Health Service 2008 Tobacco Treatment Guidelines

<https://www.ncbi.nlm.nih.gov/books/NBK63952/>

American College of Cardiology 2018 Expert Consensus Decision Pathway on Tobacco Cessation Treatment

<http://www.onlinejacc.org/content/accj/72/25/3332.full.pdf>

American College of Cardiology/American Heart Association 2019 Guideline on Primary Prevention of Cardiovascular Disease

<https://www.ahajournals.org/doi/pdf/10.1161/CIR.0000000000000678>

National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines in Oncology: Smoking Cessation

www.nccn.org/professionals/physician_gls/pdf/smoking.pdf

Professional Associations/Training Programs

Association for the Treatment of Tobacco Use and Dependence (ATTUD)

<https://www.attud.org/>

Council for Tobacco Treatment Training Programs (CTTTP):

Accreditation for Tobacco Treatment Specialist Training Programs

<https://ctttp.org/>

Additional Healthcare Provider Resources

CDC Smoking & Tobacco Use – Cessation

https://www.cdc.gov/tobacco/data_statistics/mmwr/bytopic/cessation/index.htm

CDC Healthcare Providers Tools and Resources

<https://www.cdc.gov/tobacco/campaign/tips/partners/health/index.html>

Clinical Trials on Smoking Cessation

<https://www.clinicaltrials.gov/ct2/results?cond=Smoking+Cessation&term=&cntry=&state=&city=&dist=>

Cochrane Reviews: Smoking Cessation

<https://www.cochrane.org/search/site/smoking%20cessation>

Drug Interactions With Tobacco Smoke

<https://smokingcessationleadership.ucsf.edu/sites/smokingcessationleadership.ucsf.edu/files/Documents/FactSheets/Drug%20Interactions%20with%20Tobacco%20Smoke.pdf>

Legacy Tobacco Documents Library: Truth Tobacco Industry Documents

<https://www.industrydocuments.ucsf.edu/tobacco/>

Minnesota Nicotine Withdrawal Scale

<http://www.med.uvm.edu/behaviorandhealth/research/minnesota-tobacco-withdrawal-scale>

National Institute on Drug Abuse (NIDA): 2018 Monitoring the Future Survey

<https://www.drugabuse.gov/related-topics/trends-statistics/monitoring-future>

Smoking Cessation Leadership Center at the University of California, San Francisco (UCSF)

<https://smokingcessationleadership.ucsf.edu/>

Society for Research on Nicotine and Tobacco (SRNT)

<https://www.srnt.org>

State Tobacco Activities

https://nccd.cdc.gov/STATESystem/rdPage.aspx?rdReport=OSH_STATE.Highlights

Surgeon General: Tobacco Reports and Publications

<https://www.hhs.gov/surgeongeneral/reports-and-publications/tobacco/index.html>

treatobacco.net

<http://treatobacco.net/en/index.php>

US Department of Veterans Affairs: Primary Care & Tobacco Cessation Handbook

https://www.mentalhealth.va.gov/quit-tobacco/docs/IB_10-565-Primary-Care-Smoking-Handbook-PROVIDERS-508.pdf

Smoker/Patient Resources

Action on Smoking and Health (ASH)

<https://ash.org/programs/resources/>

American Cancer Society (ACS): How to Quit Smoking or Smokeless Tobacco

<https://www.cancer.org/healthy/stay-away-from-tobacco/guide-quit-smoking.html>

American Heart Association (AHA): Quit Smoking/Tobacco/Vaping

<https://www.heart.org/en/healthy-living/healthy-lifestyle/quit-smoking-tobacco>

Campaign for Tobacco-Free Kids

<https://www.tobaccofreekids.org/>

Centers for Disease Control and Prevention (CDC):

Smoking & Tobacco Use

<https://www.cdc.gov/tobacco/index.htm>

Great American Smokeout®

<https://www.cancer.org/healthy/stay-away-from-tobacco/great-american-smokeout.html>

Military Service Members and Veterans Tobacco Campaign

<https://www.cdc.gov/tobacco/campaign/tips/groups/military.html>

National Cancer Institute: Where to Get Help When You Decide to Quit Smoking

<https://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco/help-quitting-fact-sheet>

SmokeFree.gov

<https://smokefree.gov/>

US Department of Veterans Affairs: Tobacco and Health

<https://www.mentalhealth.va.gov/quit-tobacco/how-to-quit.asp>

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