VALUE OF MEDICINES FOR Smoking Cessation

Overview of Cigarette Smoking
Cigarette smoking is a chronic, relapsing medical condition that has significant negative health, economic, and social consequences. Presently there are more than one billion smokers globally, and it is estimated that 80 percent of all smokers live in low- and middle-income countries. Based on 2010 figures, more than 300 million people in China smoke (nearly totaling the U.S. population). It is further estimated that one in five adults in the U.S. and U.K. smoke. By 2030 the total number of smokers globally could reach 2 billion, based on current population and smoking trends. Below is a graphic depicting regions with highest smoking prevalence.

World Cigarette Consumption
By region, 2009


The reasons people start smoking vary and data suggest virtually all people who smoke start doing so by the age of 26. Adolescents demonstrate greater sensitivity to the effects of nicotine and require fewer cigarettes to develop nicotine dependence than adults. Regardless of age, people continue to use tobacco because they are addicted to nicotine, one of the primary chemical components of tobacco, and want to avoid nicotine withdrawal symptoms. In the U.S. nicotine is the most common form of chemical dependence. Combustion of tobacco is the most effective method for nicotine delivery. More than 43 trillion cigarettes were smoked between 2002 and 2012. According to the World Health Organization (WHO), tobacco is one of the biggest public health threats the world has ever seen.

KEY TAKEAWAYS

- Tobacco is, "one of the biggest public health threats the world has ever seen."'
- By 2030, the number of smokers globally could reach 2 billion.
- Cigarette smoking is the number one preventable cause of death.
- Each year 6 million people die from tobacco.
- Tobacco Control is one of the most rational, evidence-based policies in medicine.
- Access to effective and comprehensive treatment for tobacco dependence is a proven policy strategy to reverse the tobacco epidemic.
Burden of Cigarette Smoking

Societal Health and Economic Burden

Cigarette smoking remains the number one preventable cause of death worldwide and plays a major role in the development of cardiovascular disease (CVD), chronic obstructive pulmonary disease (COPD), cancer, and pregnancy complications. As smoking rates decline in industrialized countries, the pendulum is shifting to the developing world, where 50 percent of men and 9 percent of women currently smoke. Each year 6 million people die from tobacco, and cigarette smoking caused the death of 100 million people in the 20th century alone. In the U.S., cigarette-related deaths account for more than car accidents, alcohol use, illegal drug use, suicide, homicide, and AIDS deaths combined. Additionally, secondhand smoke, or environmental tobacco smoke (ETS), contributes to more than 600,000 deaths per year globally.

Unfortunately, even at the start of the 21st century, many of the harmful effects of cigarette smoking have not been widely known in both industrialized and developing countries. A 2002 survey found more than 25 percent of smokers in Australia, Canada, the UK and U.S. did not associate cigarette smoking with stroke, while a separate 2009 study found less than 40 percent of Chinese smokers were aware it causes coronary heart disease (CHD) and less than 30 percent were aware it leads to stroke. A WHO report found that in developing countries, for every $5,000 dollars in cigarette revenues, only $1 is spent on tobacco control. The lack of spending to control tobacco will only exacerbate an already grave situation. As one author has said, “The combination of continued smoking and aging will vastly increase the future adverse effects of tobacco use on cancer and other chronic diseases, unless effective campaigns can be mounted to promote cessation.”

Key Facts and Figures: Health

- Up to half of all tobacco users will die as a result of their tobacco use.
- Smoking is responsible for 90 percent of lung cancer related deaths.
- Fifteen types or subtypes of cancers have been linked directly to cigarette smoking, including esophageal, oral, bladder, lung, and pancreas.
- The health benefits from quitting smoking are considerable and well documented. However, reducing the number of cigarettes smoked, without quitting, does not reduce a person’s mortality risk from tobacco-related diseases.
- Active smokers have a 30–40 percent greater risk of developing diabetes than nonsmokers.
- Studies have shown the involuntary exposure to second-hand smoke increases risk of developing coronary heart disease (CHD) by 25–30 percent, and lung cancer by 20–30 percent.
- It’s estimated that 85–90 percent of COPD cases can be linked to cigarette smoking and between 15–20 percent of smokers are likely to develop COPD. According to the WHO, 3 million people died of COPD in 2005.

Key Facts and Figures: Economic

- According to a study published in 2012, the direct costs attributable to smoking totaled $34.8 billion across the U.K., Germany, France, and Spain and $104 billion in the Americas.
- The estimated economic cost (direct and indirect) of smoking in China in 2008 was $28.9 billion.
- “A 24-year-old who smokes can expect to incur about $140,000 in supporting his or her habit over the life cycle”—approximately $33 dollars per pack.
• In the U.S., tobacco use causes more lost worker production time (LPT) than alcohol consumption, family emergencies, age, or education.\(^3\)

While many components found in cigarettes are responsible for their toxicity, smoking addiction results from the pharmacological effects of nicotine.\(^34\) Upon inhaling cigarette smoke, it takes nicotine approximately 10 seconds to reach the brain via the circulatory system. Once in the brain, nicotine disperses and binds to nicotinic acetylcholine receptors (nAChRs). Stimulation of these nAChRs by nicotine releases various neurotransmitters, including dopamine. The release of dopamine produces a pleasurable experience, which, along with the desire to avoid the unpleasant experience of withdrawal, drives continued addiction to nicotine. The prevention of withdrawal is one of the biggest barriers smokers must overcome to realize abstinence. \(^35, 36, 37\)

Advances in Tobacco Control, Smoking Cessation, and Alternatives to Smoking

Many governments have instituted tobacco control strategies to curb its use. Tobacco control has been called "one of the most rational, evidence-based policies in medicine."\(^38\) The WHO defines tobacco control as "strategies that aim to improve the health of a population by eliminating or reducing their consumption of tobacco products and exposure to tobacco smoke." These strategies include elements such as pricing and tax measures, smoking bans (to deter ETS), education and awareness campaigns, access to smoking cessation support and medication, and regulations on advertising and package labeling.\(^39\) Such efforts have helped raise awareness to the benefits of quitting smoking.

A study conducted by the Centers for Disease Control and Prevention evaluating adult quitting smoking in the U.S. during 2001–2010 found that 68.8 percent of all smokers in the U.S. would like to quit. A separate study found that 44 percent try to quit each year, mostly without assistance, and that only 4 percent to 7 percent of smokers who attempted to quit unaided were likely to have succeeded in quitting.\(^40, 41\) National Tobacco Control strategies should, therefore, offer access to approved therapies for those desiring to quit,\(^42\) as increasing smokers’ access to effective and comprehensive treatment for tobacco dependence is a proven policy strategy to combat the tobacco epidemic.\(^43\)

In 1978, the U.S. FDA approved nicotine replacement therapy (NRT), offered in the form of gum, as an aid to smoking cessation. In the years since the introduction of NRT gum, innovations in NRT have included patches, lozenges, inhalers, and nasal sprays. NRT works in a stepwise approach by providing incrementally less amounts of nicotine over time. This approach helps smokers avoid pronounced nicotine withdrawal symptoms. Pooled analysis of NRT trials demonstrated that NRT has demonstrated efficacy as an aid to smoking cessation, with six-month quit rates nearly twice as much as placebo.\(^44, 45\)

The second medication approved by the FDA as an aid to smoking cessation was initially approved as an antidepressant, but later received an indication as an aid for smoking cessation as well. As stated above, when nicotine enters the brain it causes the release of dopamine. If the levels of nicotine go down, the body removes the dopamine in a process called “reuptake.”


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When the dopamine is removed, the pleasurable affect the smoker desires is also removed. It's believed this agent works by blocking the reuptake of dopamine. Currently there is only one medication available in this drug class.

The third medication approved by the FDA as an aid to smoking cessation treatment is in a drug class called nicotinic acetylcholine receptor (nACHR) partial agonist. The mechanism of action for nACHRs antagonist/partial agonist is to bind to nicotine receptors causing a limited release of dopamine, while preventing nicotine from doing so. In animal studies, the dopamine released through this mechanism of action was 35 percent to 60 percent that of nicotine. Currently, there is only one medication available in this drug class.

While “simple advice” from a physician has shown to increase abstinence rates by 30 percent, according to the Public Health Service Guideline the combination of medication and counseling is more effective in helping smokers achieve abstinence than either of them alone.

Key Facts and Figures:

- One year after cessation, a former smoker’s risk of heart attack drops to half that of current smokers, and after 15 years of abstinence, heart attack and stroke risk is equal with those who never smoked.
- In a study of patients with COPD, pharmacological therapy plus counseling was shown to double 12-month abstinence rates versus counseling alone.
- An analysis of 38 studies, totaling of over 15,000 participants, suggests that intense behavioral support with the aid of pharmacotherapy will increase the success rates by about 16 percent.
- Analysis of tobacco control strategies across 18 European countries found these strategies, despite varying in their levels of development, correlated to quit rates between 22.4 percent to 62.2 percent among men, and between 25 percent to 26.9 percent among women ever-smokers aged 25–59 years-old.

Research to better understand the pathophysiology of nicotine addiction is ongoing, as are efforts to reduce the harmful effects of smoking. Innovations in smoking cessation include research into anti-nicotine vaccines, which induce antibodies that bind to nicotine in the blood, preventing it from crossing the blood-brain barrier.

In recent years, electronic cigarettes (also known as e-cigarettes) or electronic nicotine delivery systems (ENDS) have become widely available. These battery operated devices, which usually resemble a cigarette or pen, transform nicotine and other substances into an inhaled vapor and have been marketed by manufacturers as a safer or healthier alternative to tobacco smoke. With the exception of statements about the product needing to be substantiated, the promotion of e-cigarettes is currently not regulated in the majority of countries; however, several U.S. states have instituted some form of e-cigarette ban, and the U.S. FDA is expected to propose a rule in early 2014 that will likely cover e-cigarettes.

Currently, the benefit-risk profiles of e-cigarettes are unknown, and thorough evaluations (short, and long-term) are required to ensure a full understanding of whether these products are safe for their intended use and if there are any benefits associated with using these products.

Cigarette smoking is deadly, and for those desiring to quit, “research suggests that the best way for people to quit smoking is through evidence-based smoking cessation technologies and programs.” The value of smoking cessation therapies is that they are evidence-based technologies to help smokers quit.