

Smoking Cessation: Barriers and Available Methods

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Introduction

Tobacco use is the leading global cause of avoidable death worldwide and a key modifiable risk factor for the development of a range of diseases, including cardiovascular disease, chronic obstructive pulmonary disease and some cancers (1-3). In the 1960s, the US Surgeon General and American Heart Association issued reports warning of the dangers of smoking on fatal coronary artery disease (4-6). Since those early publications, 32 US Surgeon General reports have been released exposing the harmful effects of cigarette smoking on cardiovascular health (7,8). The 1983 Surgeon General's Report (9) was devoted entirely to cardiovascular disease. It concluded that cigarette smoking is one of the three major independent risk factors for heart disease.

Compared to non-smokers, exposure to cigarette smoke increases the risk of developing myocardial infarction (10-12), heart failure (13,14), peripheral artery disease (15,16), abdominal aortic aneurysms (17,18) and increased risk of stroke (19). Cigarette smoke exposure also increased the risk of developing new arrhythmias in a dose-dependent manner (20-23) including atrial fibrillation (AF) (24,25), ventricular tachycardia (VT) and ventricular fibrillation (VF) (26,27) and increased risk of sudden cardiac death (28). In patients who have undergone revascularization through either PCI or CABG, continued exposure to cigarette smoke was found to be associated with increased incidences of adverse

clinical outcomes (29) including stent thrombosis (30-32) or graft occlusion (33,34), new MI and reinfarction (35-37), and increased length of hospital stay (38).

Though cigarette smoke exposure leads to detrimental effects on the human body and especially on the cardiovascular system, it was found that these effects could potentially be reversed through smoking cessation (39-41). Improvements in both FMD and cIMT values were found in as little as 1 year post smoking cessation in active smokers (42-46). A meta-analysis of 20 studies showed a 36% reduction in the crude relative risk of mortality for patients with coronary heart disease who quit smoking compared with those who continued smoking. Smoking cessation also leads to an exponential reduction in acute cardiovascular events, particularly in the first year after quitting (47).

Reduced exposure to secondhand smoke was also found to significantly reduce adverse outcomes. In various cities across the globe public smoking bans resulted in fewer hospitalizations due to cardiovascular events including acute myocardial infarction and stroke (48-53). Some of these results were apparent in as little as 6 months after enforcement of the ban legislature (54).

Consequently, the avoidance of ETS exposure among CHD patients has been acknowledged, together with smoking cessation, to 'improve outcomes as much or more than any single medical treatment can offer' (55). Smoking cessation in fact is regarded as the most effective of all preventive measures among CHD patients, reducing mortality after myocardial infarction by 35% compared with continued smoking (56).

Despite the proven efficacy of smoking cessation in improving health and well being, certain barriers prevent smoker patients from quitting. This paper serves to summarize the perceived barriers to smoking cessation,

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available methods to encourage smoking cessation and current guidelines for smoking cessation counseling and therapy.

Stages of Smoking Cessation

There are a number of established aids to smoking cessation, including a range of pharmacotherapies: nicotine replacement therapy (57), bupropion (58), varenicline (59) and behavioral approaches (group or individual counseling (60,61), self-help materials (62). One widely used behavioral approach is the 'stages of change' or Transtheoretical Model (TTM) (63,64). This approach assumes that smokers pass through a discrete series of motivational stages as described below. The model also proposes that individuals move sequentially through the stages, but may revert to earlier stages before finally achieving complete abstinence.

- a. **Precontemplation:** the individual does not perceive their smoking to be a problem and has no intention of quitting in the foreseeable future (typically over the next six months).
- b. **Contemplation:** the individual is aware that their smoking is a problem, and is thinking seriously about overcoming it but has not committed to a course of action. Contemplators may state that they are seriously considering changing their behavior within the next six months.
- c. **Preparation:** Individuals intend to take action within the next month, and have unsuccessfully taken action in the past year.
- d. **Action:** the person makes overt behavioral changes to stop smoking, and has successfully altered their behavior for a period of anything from one day to six months.
- e. **Maintenance:** the now ex-smoker works to prevent relapse and to consolidate their abstinence for more than six months.
- f. **Termination:** the individual has completed the process of change; they have a high level of confidence across all high-risk situations and no temptation to relapse.

Barriers to Smoking Cessation

Within the health behavior literature, factors that

prevent an individual from undertaking health behavior change have been referred to as barriers. Barriers are often conceptualized as either structural or individual psychosocial factors (65). Structural barriers include systems, organizations and the relationship between systems and individuals, for example, lack of accessible smoking cessation programs, lack of government initiative to curb smoking at public places and reduced taxes on tobacco products, etc. Individual barriers refer to the subjective experience of the individual, for example, physical addiction to nicotine.

This definition of barriers is congruent with the social determinants of health framework (SDHF) (66). The SDHF holds that factors across many levels; from individual genetic and physical characteristics, social and community networks, to broader influences of culture, socioeconomic determinants and the environment, influence an individual's health (67). Because the SDHF classifies determinants of health as individual, social, and broader cultural and environmental factors, it also allows the identification of distinct levels of intervention for health policies.

In the 1988 Surgeon General's Report on the Health Consequences of Smoking (68), nicotine was declared an addictive drug similar to heroin or cocaine. It is important to emphasize that nicotine itself is probably not responsible for most of the negative health consequences of smoking. Instead, persons who stop using nicotine-containing tobacco products experience an unpleasant withdrawal syndrome that may include such symptoms as depressed mood, disrupted sleep, irritability, frustration, anger, anxiety, difficulty concentrating, restlessness, decreased heart rate, and increased appetite or weight gain (69-71). The extremely unpleasant nature of withdrawal from tobacco may help explain a part of the bigger problem why many people who make an effort to stop smoking start up again, often within a matter of hours or days (72-74).

Within the general population, cross-sectional studies have found variation in the most commonly reported barriers to cessation. Enjoyment, cravings and stress management are the most frequently reported barriers (75-78). Irritability, habit, withdrawal symptoms, fear of failure and concern about weight gain are also identified as barriers to cessation (76,79,80). Patients often fail to acknowledge the risks of smoking and therefore lack the motivation to quit (81).

At the social and community level, a lack of support to quit from health professionals and other service providers was identified (82). Physicians often experience limited success using smoking-cessation counseling (SCC) and they frequently do not intervene (83). In an Indian subset of physicians it was found that the lack of time and appropriate SCC knowledge, coupled with a fear that the patients would leave their clinic, were the main identified barriers (84).

Available Methods of Smoking Cessation

Despite nicotine's powerful addictive properties, many effective treatments to help people stop smoking exist. In June 2000, the US Public Health Service released a clinical practice guideline (85), which found evidence that 5 different medications are helpful in assisting people who wish to quit smoking. When combined with certain types of counseling a person's chance of quitting increased permanently. The guideline recommended that smokers be offered both counseling and medication to increase their chance of success. For cardiac patients, such psychosocial interventions to quit smoking are recommended along with nicotine replacement therapies (86-88). The most recent European guidelines (89,90) underline the importance of assessing smoking status and offering adequate interventions for quitting smoking in cardiac patients.

a. Psychosocial Interventions for Smoking Cessation: Several intervention strategies in healthy people have shown encouraging results in systematic reviews. For self-help interventions, tailored materials were more effective than no intervention (RR 1.31, 95% CI 1.20 to 1.42) but standard materials were also efficacious (RR 1.21, 95% CI 1.05 to 1.39) (62,91). Other reviews of smoking cessation using telephone support have suggested that continuous personal contact might improve cessation rate. Continuous telephone counseling was more effective than less intense interventions such as educational self-help materials only (92). Telephone support as a single intervention increased quit rates by 37% (RR 1.37, CI 1.26 to 1.50) (93).

Different treatment providers also showed beneficial effects in smoking cessation counseling. Brief advice from a physician was effective for quitting (RR 1.66, 95% CI 1.42 to 1.94). More intense interventions were more efficacious (RR 1.84, 95% CI 1.60 to 2.13) (94,95). Counseling by nurses was less effective but still showed

positive results (RR 1.29, 95% CI 1.20 to 1.39) (96).

Rigotti et al. have demonstrated the efficacy of smoking cessation interventions for hospitalized patients (RR 1.37, 95% CI 1.27 to 1.48) and stressed the importance of at least one follow-up contact to maintain abstinence (97,98). Another review on nursing interventions also pointed out the need for follow up contacts for effective cessation (99).

b. Pharmacological Methods of Smoking Cessation:

The pronounced withdrawal symptoms and tobacco craving that occur on trying to quit smoking may be offset by various pharmacological therapies summarized as below.

1. *Nicotine replacement therapy (NRT)* (100): This aims to reduce motivation to smoke and the physiological and psychological withdrawal symptoms often experienced during a quit attempt. Although various pharmacological agents have been used in the past to aid smokers, nicotine replacement therapy has been shown to be effective and should be available in all smoking cessation programs (101-103). NRT is available as nicotine patches in various dosages (absorbed slowly through the skin), and as chewing gums, lozenges, sublingual tablets, sprays and inhalers (absorbed through the oral or nasal mucosa). The treatment is widely available on prescription, or as an over-the-counter purchase in many countries. However, the World Health Organization currently estimates that at least 38 countries do not yet support any provision of NRT (104).
2. *Bupropion*: This was developed as a non-tricyclic antidepressant, and is sometimes preferred by smokers who do not wish to use a nicotine-based treatment, or who have already failed to quit using NRT. The usual dose for smoking cessation is 150 mg once a day for three days increasing to 150 mg twice a day, continued for 7 to 12 weeks. The quit attempt is generally initiated a week after starting pharmacotherapy.
3. *Nortriptyline*: This is a tricyclic antidepressant, and is sometimes prescribed when first-line treatments have been unsuccessful. The recommended regimen is a period of titration (10 - 28 days) before the quit attempt, and a 12-week therapeutic dose of 75 to 100 mg daily.

4. *Varenicline*: This is a selective nicotinic receptor partial agonist, licensed as a prescription-only treatment for smoking cessation in the USA in 2006, and in Europe in 2006/2007(105). The standard regimen is 1mg twice a day for 12 weeks, with the first week titrated to reduce side effects, and quit date set for the second week. Varenicline has emerged as one of the most effective drugs in promoting smoking cessation (106,107).
5. *Cytisine*: This is pharmacologically similar to varenicline. Although it has been used for almost 50 years as a cessation aid, it is currently licensed only in Russia and in some former socialist economy countries, including Poland and Bulgaria. The standard regimen is a 25-day course, gradually reducing from six 1.5 mg tablets a day to two tablets a day by the end of the treatment period, with a quit date set for day five.
6. Other medications that are also used with less success rates include: antidepressants (including tricyclics, MAO inhibitors, SSRIs, atypical antidepressants), anxiolytics (including buspirone, diazepam, etc.), selective cannabinoid type 1 receptor antagonists (including rimonabant and taranabant), and many other drugs that are under research and do not warrant discussion in this paper.

Current Recommendations for Smoking Cessation

There is a large body of evidence, which suggests that due to the multifaceted effects of tobacco smoke on the human body; a multicomponent treatment strategy for smoking cessation should be implemented for any individual. This should include mandatory physician counseling along with one form of pharmacological treatment of nicotine dependence (108). Combining results from 47 trials suggests that increasing the amount of behavioral support for people using a smoking cessation medication increases the chances of quitting smoking for the long term by about 10% to 25%. Providing some support via personal contact, face-to-face or by telephone is beneficial, and people making a quit attempt using medication will increase their chances of success if they also have access to behavioral support (109). Recently the Agency for Health Care Policy and Research produced a comprehensive monograph on smoking cessation, which emphasizes the

value of smoking cessation intervention by healthcare professionals and outlines methods found to be of value (85):

- i. Every person who smokes should be counseled on smoking on every visit to the physician's office. Maintenance of cessation should be frequently discussed with patients who have quit.
- ii. Every patient should be asked about tobacco use; smoking status should be recorded and updated at regular intervals.
- iii. Cessation interventions as brief as 3 minutes are effective, with more intensive intervention being more effective.
- iv. Clinicians should receive training in patient-centered counseling methods.
- v. Office systems that facilitate delivery of smoking cessation intervention should be established.
- vi. Links with other personnel and organizations should be established to provide smoking cessation intervention (nurses, smoking cessation specialists, multiple risk factor intervention programs, community resources).

Conclusions

There is overwhelming evidence demonstrating both the cardiovascular hazards of smoking and the prompt benefit that occurs with smoking cessation. The provision of advice alone significantly increases the smoking cessation rate, and even minimal counseling yields a further benefit. Intervention with patients who have already suffered a cardiac event yields particularly striking benefits. The smoking status of all patients should be assessed and appropriate intervention offered to those who smoke. Physicians should be trained in counseling techniques and the use of nicotine replacement therapy. Presence of barriers to smoking cessation across all components of a patient's life, including individual and social barriers, government and workplace intent and access to physician counseling make it very difficult for a patient to quit smoking permanently, leading to relapses. Therefore, any comprehensive smoking cessation program should be multicomponent and try to target as many as those barriers.

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