Key points

Several factors are known to indicate whether a smoker is more likely to quit.
These include:

- Late initiation of smoking
- Longer duration of previous cessation attempts
- Lack of depression
- Low-to-moderate nicotine dependence
- Absence of alcohol-related problems
- Sustained level of motivation
- Being married
- Not having any other smokers in the household

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Smoking cessation: tips for improving success rates

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Educational aims

- To review the individual characteristics of smokers that may predict success in smoking cessation efforts; these can be of help in routine clinical consultation.

Summary

Although smoking cessation is clearly beneficial, many smokers respond poorly to smoking cessation efforts, resulting in a rather disappointing overall success rate of long-term abstinence. The perceived lack of effectiveness of smoking cessation may well influence how physicians set their priorities with regard to an effective use of their consultation time. Negative beliefs and attitudes can be resolved by increasing the general understanding of the natural history of quitting, by making sensible use of smoking cessation services, and by being aware of the correct use of drugs for nicotine dependence, when prescribed. In particular, a better understanding of the predictors of success for smoking cessation can help physicians to identify smokers who stand a relatively good chance of quitting. The purpose of the present article is to review those predictors of smoking cessation that can be of help in routine clinical consultation.

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Cigarette smoking is a modern-day epidemic that results in substantial health burden and costs. It is estimated that, with well over 1 billion smokers worldwide, tobacco use is the chief avoidable cause of illness and premature mortality in the world [1]. Health risks associated with cigarette smoke can be reversed following a sufficient period of abstinence, and achieving life-long abstinence is an important public health goal.

Smoking cessation is an important component of tobacco control policies, and evidence-based recommendations indicate that it is beneficial to smokers. Typically, the spectrum of available smoking cessation interventions ranges from simple advice to intensive behavioural support and pharmacological treatment. Unfortunately, many smokers respond poorly to smoking cessation efforts, with rather disappointing overall success rates in terms of long-term abstinence [2].

The perceived lack of effectiveness of smoking cessation may well influence how physicians set their priorities with regard to an effective use of their consultation time. Hence, identification of individual characteristics that predict success in smoking cessation efforts is highly desirable, as this could help to match smokers with a more effective cessation strategy, to identify who might need more intensive treatment and to make the most of healthcare resources.



Many studies surggest women are less likely to succeed in quitting smoking.

Problems with smoking cessation in clinical practice

Quitting is not easy. It has been reported that >70% of adult cigarette smokers had made at least one attempt to quit during their smoking careers, and ~41% of them had tried to quit in the previous 12 months [3]. Nevertheless, only ~7% of those who managed to stop smoking without external help were still abstinent 1 year later [2]. Such low cessation rates have attracted interest in the area of professional and behavioural counselling, and stimulated investment in the development of pharmacological aids for smoking cessation. Although brief advice from a medical professional may be successful in motivating smokers to quit, more intensive interventions are clearly more effective [4]. Moreover, adding drugs for smoking cessation to these interventions can approximately double the rate of abstinence [5, 6].

Unfortunately, the overall success rate of long-term smoking abstinence remains modest, even when intensive interventions are implemented [5]. This underscores the notion that smoking cessation requires a substantial change in lifestyle and, for most smokers, remains an intensive task.

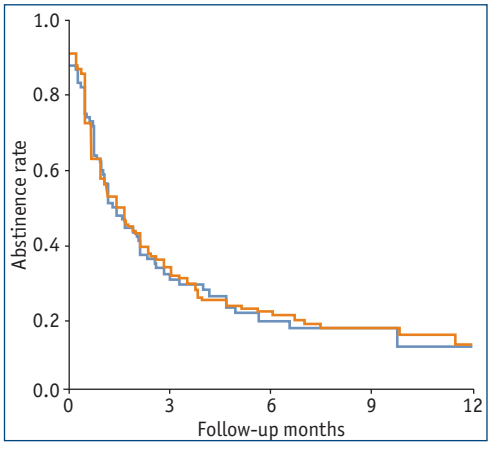

Figure 1
Kaplan-Meier curve of smoking abstinence. ——: males; ——: females. Reproduced from [8], with permission from the publisher.

Useful predictors of smoking cessation

Several factors are known to indicate whether a smoker is more or less likely to quit, and acquaintance with these can be translated into an efficient use of their physicians' consultation time.

Sex

Many studies have suggested that men have a better long-term outcome than women. Although women smoke fewer cigarettes and attempt to quit smoking at the same rate as men [2], they appear to be less likely to succeed than men, whether trying to quit on their own or when using some type of cessation assistance (nicotine replacement therapy or bupropion) [7]. However, it is interesting to note that in real-life situations there is no sex difference in effectiveness of smoking cessation treatment (figure 1) [8]. It is possible that an interaction between sex and other factors that are important in dictating the outcome of smoking cessation could explain these discrepancies. The fact that women usually have a poorer long-term outcome than men has been generally attributed to women's greater concerns about weight gain as a precipitant for relapse. Indeed, for many women cigarette smoking is an effective aid used to control weight [9]. Women have also higher rates of depression than men and thus are more likely to use smoking as a means of handling negative emotions [10]. Specific attention must be given to bodyweight gain concerns, the question of medication use in pregnancy, and the influence of social support, when assisting women in smoking cessation. This awareness could substantially enhance cessation rates in women [11].

Age at smoking initiation

The fact that age at initiation of smoking is a significant factor in the continuation of smoking later in life and appears to be a critical factor in poor cessation outcomes has been convincingly demonstrated in several studies [12, 13]. Those who began smoking at age <14 years were more likely to become heavy smokers than those who began when they were aged ≥20 years [13]. Moreover, young age at initiation may also affect the length of abstinence time (table 1): those who started smoking at age <16 years had a mean abstinence from smoking of 6.7 years, in comparison with 11 years for those who started

Table 1 *Age at smoking initiation and years of cessation*

Age at smoking initation years	Subjects n	Years of abstinence from smoking
≤11	81	6.9±12.4
12–13	103	5.8±8.3
14–15	228	6.7±10.4
16–17	279	8.8±12.1
18–19	173	7.7±10.3
20–21	105	11.0±13.1
≤22	86	9.6±13.9
Total	1057	8.0±11.6

Data are presented as mean±SD. Reproduced from [14], with permission from the publisher.

at a later age [14]. It is claimed that early exposure to tobacco could detrimentally affect a developing brain, leading to greater nicotine dependence later in life.

Depression

The association between nicotine dependence and affective disorders, particularly major depressive disorder, is well known, with high prevalence rates being reported for smokers [15, 16]. The reason for this association is not clear, but it has been argued that smoking may help individuals to cope with stress or medicate depression. Until recent years, the belief that a history of depression greatly decreases the likelihood of smoking cessation has been widely promoted [17]. It must be noted that the process of cessation itself produces withdrawal symptoms, which are more pronounced in the days immediately following cessation and generally return to baseline levels within 1 month of continued abstinence. These differences in mood disturbance appear to be related to successful cessation as well. Predictably, smokers reporting higher levels of negative mood and depressive symptoms were less likely to quit than smokers with lower levels of mood disturbance [16].

Although it is generally assumed that a history of depression may be a barrier to smoking cessation, contradictory evidence also exists. In an attempt to reconcile these conflicting findings, a meta-analysis of the published literature has been recently completed [18]; contrary to expectations, a lifetime history of major depression does not appear to be an independent risk factor for cessation failure in smoking cessation treatment. However, it must be taken into consideration that recurrent depression, in contrast to single-episode depression, might have different implications for smoking cessation.

During consultation it is advised to ascertain systematically whether a history of depression is present by using simple validated questionnaires, such as the Beck Depression Inventory. Smokers in this category are likely to experience intense withdrawal symptoms and will benefit from intensive pharmacological treatment for smoking cessation during the first 2–3 weeks of abstinence. Moreover, a judicious use of antidepressants should be considered and referral to a specialist for the most challenging cases is advised [19].

Nicotine dependence

Severity of nicotine dependence has been hypothesised to be an important predictor of successful smoking cessation [20–24]. Severity of nicotine dependence is generally assessed by means of the Fagerström Test for Nicotine Dependence (FTND), and smokers with severe nicotine dependence are characterised by a FTND score ≥7 (table 2) [25].

Such nicotine-dependence measures also appear to identify those smokers requiring high-dose nicotine pharmacotherapy [26, 27].

In general, smokers with a FTND score ≥7 are likely to experience intense withdrawal symptoms and may be expected to relapse early. Smokers in this category could benefit from more intensive pharmacological treatment for smoking cessation during the first weeks of abstinence [20, 22]. Successful cessation may require multiple attempts.

Table 2 **The Fagerström Test for Nicotine Dependence**

Questions	Answers	Points
How soon after you wake up do you have your first cigarette?	Within 5 min	3
	6-30 min	2
	31-60 min	1
	After 60 min	0
Do you find it difficult to refrain from smoking in places where it is forbidden, such as in church, libraries or movie theatres?	Yes	1
	No	0
Which cigarette would you hate to give up most?	The first one in the morning	1
	All the others	0
How many cigarettes do you smoke per day?	10 or less	0
	11-20	1
	21-30	2
	31 or more	3
Do you smoke more frequently during the first hours after waking than during the rest of the day?	Yes	1
	No	0
Do you smoke if you are so ill that you are in bed for most of the day?	Yes	1
	No	0

Scoring is as follows. 0-2 points: very low addiction; 3-4 points: low addiction; 5 points: medium addiction; 6-7 points: high addiction; 8-10 points: very high addiction.

Family enviroment may be a factor in both taking up and quitting smoking.

Alcoholism

Alcoholism is a negative prognostic factor for successful smoking cessation and discontinuation of alcoholism is likely to increase the potential for successful smoking cessation [28, 29]. Although the mechanisms for the detrimental effect of alcoholism on smoking cessation are not clearly defined, controlled studies have shown that alcohol increases the reported urge to smoke (tables 3 and 4) [30, 31].

It appears that low-intensity programmes are not effective in patients undergoing treatment for alcoholism [32]. Behavioural therapy for smoking cessation that is similar to standard counselling approaches for alcohol dependence has been shown to be very effective in recovering alcoholics, with cessation rates at 1 year that are comparable to those in people without alcohol addiction [33].

If a history of current alcoholism is present, a referral to a specialist centre may be recommended, because smokers in this category have been shown to perform poorly in smoking cessation programmes. Nonetheless, smokers with a mild alcohol problem can be advised to quit by their physician without the need for specialist referral. However, the notion that even low-to-moderate alcohol consumption during smoking cessation may decrease treatment success calls for a sensible plan against alcohol use during smoking cessation efforts.

Table 3 Drinking behaviour in smokers and nonsmokers: lifetime association

	Smokers	Nonsmokers	OR	95% CI	p-value
Subjects n	424	583			
Drank 1 drink per month for ≥6 months %	91.3	78.6	2.8	1.9-4.2	<0.0001
Alcohol abuse or dependence %	38.0	16.3	3.1	2.3-4.2	<0.0001
≥4 drinks daily for 2 weeks %	13.9	4.8	3.2	2.0-5.1	<0.0001
≥7 drinks daily for 2 weeks %	10.1	2.6	4.3	2.3-7.8	<0.0001

OR: odds ratio; CI: confidence interval. Reproduced from [28], with permission from the publisher.

Table 4 Point prevalence and continuous smoking abstinence rates by alcohol use at baseline

	Assessment point				
	Week 12	Week 24	Week 38	Week 64	Continuous abstinence
Drinkers %	37.5	27.6	25.7	20.4	15.5
Nondrinkers %	52.2	45.7	41.3	45.7	30.4

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Motivation

Individual motivation to stop smoking can predict success with smoking cessation [34, 35]. Tests to assess the level of motivation are available, but these are cumbersome, time consuming or poorly validated. However, physicians can ask smokers to rate their level of motivation or confidence on a scale of 0–10; this can be quite useful and it takes ~30 seconds.

As the effect of motivation on outcome appears to wane with time (usually in a few weeks), it is imperative that physicians take full advantage of the smoker's momentum and set a quit date as soon as possible [36]. The medical visit is a time in which health is salient, and smokers may be more receptive to attempts aimed at increasing their level of motivation. Motivational interviewing is a client-centred, directed method for enhancing motivation to

The motivational intervention for patients not ready to make a quit attempt now: "the five Rs"

Relevance
Encourage the patient to indicate why cessation is personally relevant

Risks
Ask the patient to identify the potential negative consequences of tobacco use

Rewards
Ask the patient to identify the potential benefits of cessation

Roadblocks
Ask the patient to identify barriers or impediments to cessation

Repetition
The motivational intervention should be repeated every time an unmotivated patient has an interaction with a clinician. Tobacco users who have failed in previous quit attempts should be told that most people make repeated quit attempts before they are successful.

change by exploring and resolving ambivalence. Brief versions of motivational interviewing that can be easily incorporated into the medical visit are also available [37].

In practice, it is best to consider the level of the smoker's commitment and/or effort in relation to the tasks set in their specific smoking cessation programme. Our duty as physicians is to keep these smokers motivated throughout their cessation efforts by means of frequent consultations and motivational interviewing. For those not interested in quitting, it is important that some motivational counselling occurs during the medical visit, which is a window of opportunity. Alternatively, physicians should be encouraged to use their regular contacts with smokers to gradually increase their level of motivation towards a cessation attempt with the "5 Rs": relevance, risks, rewards, roadblocks and repetition (see box on next page) [38].

Previous cessation attempts

In general, it is believed that cigarette smokers with a history of previous unsuccessful cessation attempts are less likely to quit, probably because these are seen to express a weaker intention to give up. In contrast with this general belief, cessation history has been consistently shown to predict smoking cessation [39, 40]. Both the number and duration of previous unassisted cessation attempts are important predictors of subsequent long-term cessation. Those with a history of cessation attempts lasting >5 days were much more likely to succeed [41]. Conversely, reported shorter periods of abstinence on prior cessation attempts were markedly associated with relapse [42]. A positive history of previous cessation attempts should be exploited to boost motivation, because if a smoker managed to quit in the past it is more likely that they will be successful in a future smoking cessation attempt. In particular, given that the longer a smoker remained abstinent (>5 days) the more they are likely to succeed on a subsequent attempt, the physician might reinforce any effort to extend abstinence, at least as practice for the next attempt. Also it is important to elicit what led to previous relapses, in order to identify ways to prevent future relapse [40–42].

Social/familial environment

In adult smokers, occupational social class, social support, the number of smokers in the household, marital status and the level of support from family members appear to be important predictors of smoking cessation [43].

Smokers are more likely to marry smokers, to smoke an equivalent number of cigarettes as their spouse, and to quit at the same time [44]. Smokers who are married to nonsmokers or ex-smokers are more likely to quit and remain abstinent [45]. The notion that support from the spouse is highly predictive of successful smoking cessation has been known for a long time [46]. In particular, supportive behaviour, involving cooperative behaviour and reinforcement, are likely to predict successful cessation, whereas negative behaviours are likely to be predictive of relapse. Thus, supportive behaviours were shown to be associated with successful smoking cessation, whereas negative or critical behaviours were related with earlier relapse [47]. The notion that family support is an important component of effective cessation stems from two recent systematic reviews that addressed the effectiveness of partner or social support interventions in smoking cessation, and which concluded that these interventions may be of some benefit [2, 48]. In the current authors' opinion it is important to consider partner and familial support as part of an existing smoking cessation programme.

Educational questions

Are the following statements true or false?

1. Nicotine dependence is a good predictor of smoking cessation.
2. History of previous unsuccessful cessation attempts does not predict unsuccessful smoking cessation.
3. Age at initiation of smoking is a significant factor for continuation of smoking later in life, and appears to be a critical factor for poor cessation outcomes.
4. In adult smokers, occupational social class, social support, the number of smokers in the household, marital status and the level of support by family members appear to be important predictors of smoking cessation.

Final considerations

Despite the clear benefits of helping smokers to quit, there is a growing trend in physicians' indifference or scepticism towards the efficacy of smoking cessation programmes [49]. This may be due to a number of reasons, including poor understanding of the natural history of cessation, the under-use of smoking cessation services, improper use of drugs for nicotine dependence (when prescribed) and a lack of awareness of common predictors of smoking cessation. Physicians' expectations of successful cessation must be reframed, since most smokers are known to relapse at some stage. For those who relapse, it is important to maintain contact so that relapse can be caught early enough to facilitate rescue. Typically, multiple attempts are required before achieving success. A better understanding of the predictors of smoking cessation can be useful in identifying potential quitters and likely relapsers.

Common predictors of smoking cessation

Domain	Factor	Practical recommendations
Personal and demographic	Female sex	Special considerations often must be given when assisting women to quit smoking. These include: addressing body weight gain concerns; the question of medication use in pregnant smokers; menstrual cycle influences on mood and withdrawal; the influence of social support; and the possibility of greater sensitivity of women to environmental cues associated with smoking. Some medications can help attenuate bodyweight gain, at least temporarily, and may alleviate menstrual cycle influences and even responsiveness to cues. Greater focus on developing improved counselling interventions for these and other issues surrounding cessation could substantially enhance cessation rates in women.
	Age at smoking	Early smoking initiation points to significant nicotine initiation dependency and high risk of relapse; it is advised to institute an aggressive smoking cessation strategy from the beginning.
	Previous cessation	A positive history of previous cessation attempts should be attempts exploited in order to boost motivation, because if a smoker managed to quit in the past it is more likely that he/she will be successful in a future smoking cessation attempt. In particular, given that the longer a smoker remained abstinent (>5 days) the more he or she is likely to succeed on a subsequent attempt, the physician might reinforce any effort to extend abstinence, at least as practice for the next attempt. Also it is important to elicit what led to previous relapses, in order to identify ways of preventing future relapse.
Psycho-physiological	Depression	During consultation it is advised to ascertain systematically whether a history of depression is present. Smokers in this category are likely to experience intense withdrawal symptoms and will benefit from intensive pharmacological treatment for smoking cessation during the first 2–3 weeks of abstinence. Moreover, a judicious use of antidepressants should be considered and a referral to a specialist for the most challenging cases is advised.
	High level of nicotine	In general, smokers with a FTND score >7 are likely to experience intense withdrawal symptoms and may be expected to relapse early. Smokers in this category could benefit from more intensive pharmacological treatment for smoking cessation during the first weeks of abstinence.
	Alcohol use and abuse	All smokers should be advised to quit by their physician, but if a history of current alcoholism is present, a referral to a specialist centre may be recommended, because smokers in this category have been shown to perform poorly in smoking cessation programmes [28, 29]. However, a smoker with a mild alcohol problem probably would not need to be referred to a specialist. In addition, the notion that even low-to-moderate alcohol consumption during smoking cessation may decrease treatment success calls for a sensible plan against alcohol use during smoking cessation efforts.
	Low motivation	Motivational interviewing may be required. For those not interested in cessation, it is important that some motivational counselling occurs during the medical visit, which is a window of opportunity. As an alternative, physicians should be encouraged to use their regular contacts with smokers to gradually increase their level of motivation towards a cessation attempt with the "5 Rs": Relevance, Risks, Rewards, Roadblocks and Repetition.
Social and familial context	Being married (or living as a couple) and/or not having any other smokers in the same household	It is important to take advantage of partner and/or familial support as part of an existing smoking cessation programme.

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Suggested further reading

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Soria R, Legido A, Escolano C, López Yeste A, Montoya J. A randomised controlled trial of motivational interviewing for smoking cessation. Brit J Gen Pract 2006; 56: 768–774.
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Suggested answers

1. True.
2. False.
3. True.
4. True.

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