Chapter 5

Tobacco and Smoking Cessation

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Abstract

Smoking cessation is essential for COPD patients. It mitigates the progression of the disease and the loss of ventilatory capacity, thus improving the overall prognosis. Overall mortality can be reduced effectively including mortality from respiratory diseases as well as lung cancer and cardiovascular diseases. Its main goal must be to initiate tobacco cessation as early as possible after diagnosing COPD so as to enable the patient to influence the course of this disease in the most effective way possible. Depending on the degree of tobacco addiction, the application of behavioural therapy combined with pharmaceutical support has shown to be the most reliable therapy with highest long-term abstinence rates. Particular consideration is needed for patients with psychiatric comorbidity mainly represented by depression. The setting of tobacco cessation measures in outpatient clinics or practices embedded in long-term therapy of the underlying respiratory disease appears to be crucial for long-time abstinence.

Keywords: smoking cessation, behavioural therapy, nicotine replacement, varenicline, bupropione, abstinence rates, e-cigarette

1. Introduction

In continuous long-term smokers, the exposition of the bronchial mucosa to the toxic components of cigarette smoke results in a progressive inflammatory process with the consequence of functional and structural destruction of the airways. Thus, the ventilatory capacity in terms of respiratory volumes FEV1 and VC is reduced and hyperinflation/development of emphysema is increased in accelerated speed and patients face respiratory failure with stepwise progression of the disease [1–3]. After progression of lung function loss, gas exchange for oxygen and carbon dioxide is compromised resulting in hypoxaemia and hypercapnia. The patient's exercise ability is reduced to a minimum bringing him into the position that he needs help in even basic daily activities. Pharmaceutical therapy to relieve—mostly

inhalation therapy—will not be a sufficient intervention and long-term oxygen therapy, nocturnal ventilation therapy, volume reduction measures up to lung transplantation may be considered. In addition as a consequence of the mucosa destruction, the bronchial system progressively loses the ability of mucociliary clearance resulting in higher deposition rates of the toxic components of smoke, thus enabling these substances to act carcinogenic. Consequently, continuous smokers with COPD show higher lung cancer rates compared to non-COPD individuals [4–6]. Smoking cessation, thus, must be the first measure to be taken in the treatment of COPD patients at the earliest possible time. Yet, in spite of this knowledge, a great proportion continues smoking due to various barriers among which the high degree of addiction is to be mentioned in the first place. Moreover, physicians sometimes consider smoking cessation therapy as addiction therapy as not their business or state that the majority of and former smokers had stopped on their own and by pure willpower [7], or out of section non-predictable "catastrophic" decision [8], thus neglecting the urgent need to stop the toxic smoke exposition of the bronchi as early as possible. The earlier tobacco consumption is stopped, the less the disease will develop and compromise the patient's prognosis.

2. Evidence and rationale of smoking cessation in COPD patients

Smoking is the main cause of COPD. Close to 90% of patients with COPD have a continuous smoking history. One of three continuous smokers develops COPD disease [9–12].

Susceptibility to smoke differs in gender and races. Women have a higher susceptibility to smoke compared to men, the same applies to African-American people compared to Caucasians [13–16].

Smoking and COPD represent a maximal risk for lung cancer. COPD increases the risk of developing lung cancer possibly due to the loss of the clearing capacity of the mucociliary system as a result of toxic impact of tobacco smoke. The underlying mechanisms of cellular and molecular transformation and alteration are subjects of further research, whereas the close relationship of the exceeding probability of lung cancer in COPD patients is clear [4, 17–21].

Smoking cessation allows increase of lung function in patients with COPD. A 1-year follow-up after smoking cessation shows a limited increase in lung function in COPD patients [3].

Smoking cessation allows optimal preservation of remaining ventilatory capacity in patients with COPD. Long-term observation of the course of lung function shows a lower year by year decrease after smoking cessation compared to continuous smokers who failed to stop [3, 22].

Only smoking cessation effectively leads to longer survival in COPD patients by the prevention of progression towards respiratory impairment and failure. One of the main results of the lung health study is the evidence for longer survival in COPD patients after 14.5 years [23].

Smoking cessation allows the improvement of coughing, shortness of breath and bronchitis within weeks. Within only 4 weeks, a marked decrease of coughing and bronchitis symptoms as well as shortness of breath is observed after smoking cessation [24].

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3. Smoking cessation: motivation, methods and techniques

Smoking cessation as the main measure for treating COPD patients who still smoke is very well established in guidelines on an international and national basis an in Cochrane Reviews [25, 26].

3.1. Motivational interviewing strategy

Motivational interviewing (MI) technique [27] is a fundamental tool for initial motivation.

Primary motivation towards tobacco cessation is essential to start patient's action. Motivational interviewing technique has showed to be most effective and time effective at this end. The technique consists, in short, in interviewing the patient himself on his own attitudes towards his smoking while respecting his autonomy. While doing so, the patient will produce his main possible reasons in favour of smoking cessation like health concerns, financial issues, aspects of beauty/concerns of premature ageing, being a good example for the children etc. While explaining these reasons to the interviewer, the patient will influence his own tendency to move towards cessation and thus increasing the level of his own motivation for action.

3.2. The 5A-strategy and the 5R-strategy

The therapists duty is to increase the patient's understanding and motivation. Clinicians can make a difference with even a minimal (less than 3 minutes) intervention. A relation exists between the intensity of intervention and tobacco cessation outcome. Even when patients are not willing to make a quit attempt at this time, clinician-delivered brief interventions enhance motivation and increase the likelihood of future quit attempts [28]. Tobacco users are being primed to consider quitting by a wide range of societal and environmental factors (e.g., public health messages, policy changes, cessation marketing messages, family members). There is an evidence that smokers who receive clinician advice and assistance with quitting report greater satisfaction with their health care than those who do not [29, 30]. The goal of these strategies is clear: to change clinical culture and practice patterns to ensure that every patient who uses tobacco is identified. Several observations are relevant to this theme. Although many smokers are reluctant to seek intensive treatments, they nevertheless can receive a brief intervention every time they visit. The time limits on physicians as well as reimbursement restrictions, often limit providers to brief interventions, although more intensive interventions would produce greater success.

The **5A technique** (see **Table 1**) includes to "ask, advise, assess, assist, arrange…" [25].

Ask: at every single encounter, the patient is asked whether he is a smoker and how much the consumption is.

Advise: smokers will be given the clear advice to stop smoking for health considerations.

Assess: the smoker's willingness to take action for smoking cessation is to be assessed.

Assist: in case of the smokers willingness to quit she/he shall be given assistance to do so.

Arrange: follow-up is to be arranged to support success.

Ask	At every single encounter, the patient is asked whether he is a smoker and how much the consumption is. Patients who are most repeatedly will expect the question in subsequent meetings. This by itself increases the ambivalence towards the individual smoking behaviour.
Advise	Smokers will be given the clear advice to stop smoking for health considerations. The advice must be clear without possible evasions as to the "if" and "when." If this advice is not been given by the physician, the patient will interpret it as active permission to continue smoking.
Assess	The smoker's willingness to take action for smoking cessation is to be assessed. If there is a substantial willingness to quit, the patient must be given a detailed possible instruction to proceed. Often, the first hint may be the patient asking for more information on how to proceed. Detailed information then shall be given in a neutral way respecting the patient's autonomy regarding his decision for the next step.
Assist	In case of the smokers willingness to quit she/he shall be given assistance to do so. It is crucial that any major delay for the realisation is avoided as with time the motivational state of the patient is at risk.
Arrange	Follow-up is to be arranged to support success. The main goal is to avoid the risk of relapse and if relapse happens to help the patient to resume abstinence and stabilise it. Follow-up intervals must be adapted individually.

Table 1. Assessment of motivation and steps towards smoking cessation: The 5A-strategy [21].

Usually the first three steps ask/advise/assess are being applied repeatedly until finally the smoker might feel that his willingness to start action has reached the point.

The **5R-strategy** for patients unwilling to quit–"relevance, risk, rewards, roadblocks, repetition" (see **Table 2**) has shown to be helpful [25]. Using this, the 5R technique allows advancing an individual's state of readiness in quitting smoking, and strengthening their motivation to quit smoking.

Relevance: the relevance of quitting is discussed with the patient taking into account the individual health condition of the person.

Risk: the individual risk of the patient if continuing smoking is being made clear.

Rewards: the improvements of health conditions the patient can expect after quitting are discussed.

Roadblocks: barriers that hinder the smoker to take action are discussed in detail, for example, fear of withdrawal symptoms, fear of weight gaining etc.

Repetition: the strategy is to be performed repeatedly at every encounter with a smoker.

It has to be underlined that the main principles of the motivational interviewing technique shall be applied in the 5R-strategy. Among them, maintaining the smoker's autonomy may be the most important: pushing the patient towards any action must be avoided. Instead, all discussions shall be led following a pattern like "… if you as a smoker decided to quit: what might be the biggest advantage for you motivating you to do so …?"

3.3. Behavioural therapy

Behavioural therapy in various strategies is outlined as the main element of effective smoking cessation therapy [31, 32]. There is a strong dose-response relationship between the intensity of

Relevance	The relevance of quitting is discussed with the patient taking into account the individual health condition of the person. This means that the patient must be enabled to develop a clear understanding of his personal risks concerning his disease status which she/he shall understand clearly. Instruction must follow the intellectual capabilities of the patient.
Risk	The individual risk of the patient if continuing smoking is being made clear. Particularly for COPD patient, the course of her/his lung function loss with and without smoking respectively shall be made understood so the patient can understand how much her/his prognosis depends on successful quitting.
Rewards	The improvements of health conditions and life conditions the patient can expect after quitting are discussed. This includes short-term advantages like better exercise capabilities and less bronchitis symptoms within weeks as well as long-term rewards like longevity and overall performance improvement in later years. It also includes non-health advantages like saved money, better cosmetic appearance, being a better example for own children, gaining autonomy while losing dependence on nicotine etc.
Roadblocks	Barriers that hinder the smoker to take action are discussed in detail, for example, fear of withdrawal symptoms, fear of weight gaining etc. The therapist will ask the patient to find her/his own strategies to overcome the individual roadblocks of the particular patient by asking him to develop own personal solutions.
Repetition	The strategy is to be performed repeatedly at every encounter with a smoker. It is essential to focus on the necessity of abstinence at every meeting with the patient. Failure to bring the patient to action in one meeting is not a failure of the strategy. The repeated focusing on quitting by itself increases the patient ambivalence thus facilitating the development of eventual motivation towards action.

Table 2. The 5R-strategy for patients unwilling to quit [25].

tobacco dependence counselling and its effectiveness [33]. Interventions are designed to meet the smoker's limited willingness to take part in specific interventions on one hand and the knowledge that "the more the better" intervention should be intense with frequent days and long follow-up on the other hand. Successful interventions for smoking cessation group therapy are mostly restricted to 3–6 dates within 2–6 weeks with a total duration of about 10 hours. Programs following similar conception achieve abstinence rates of 30–45% after 12 months [34–37]. Behavioural therapy for smoking cessation includes psychoeducation aiming to establish a clear understanding of the necessity of quitting to stop negative effects mainly on health. Participants are being enabled to identify their personal smoking trigger situations and to develop alternative strategies to avoid smoking. This is done by explicitly increasing the ambivalence of the addicted smoker as to short-term smoking associated advantages in contrast to long-term disadvantages and risks. Participants receive support for preparation of their smoke stop day with detailed planning of the individual realisation. Participants receive detailed preparation for management of relapse risk situations and are being enabled for alternative strategies to avoid relapse. While there is a correlation of abstinence rates and intensity/duration of behavioural intervention, patients frequently are reluctant to accept longer behavioural interventions with multiple dates due to limitations from their daily life [38].

3.4. Pharmacotherapy

Pharmacotherapy can support smoking cessation therapy in patients with higher degrees of nicotine addiction and thus increase abstinence rates [39]. To measure total nicotine withdrawal

discomfort or craving, various scales may be used [40]. The major underlying mechanism for increased abstinence rates with pharmacotherapy support consists in the continued partial saturation of nicotine specific receptors (α4β2 receptors) in the ventral tegmental area of the brain allowing to maintain dopaminergic activity. Under this protection regarding the direct nicotine addiction proportion of tobacco dependence, the behavioural changes towards abstinence are facilitated while the exposition to toxic components of cigarette smoke is ended.

3.5. Nicotine replacement therapy

Nicotine replacement therapy [41] is longest established in support of smoking cessation therapy. Various OTC applications are available. Dosage should be planned following the smoking consumption amount at the time of the smoke stop. Roughly, smoking one cigarette results in the uptake of about 2 mg of nicotine for the smoker. Given, a smoker's consumption is 20 cigarettes a day, the replacement at the start of the measure should be roughly 40 mg. The composition of replacement products may be a basic application of a patch and addition of gums, lozenges or parts of oral nicotine spray to reach the amount. Side effects of nicotine replacement therapy are mostly restricted to irritability/impairment of sleep and sometimes local skin irritation (patches). Due to impaired teeth conditions, gums may not be applied properly. There is no evidence that NRT increases the risk of heart attacks [42, 43]. The toxic lethal dose of nicotine will not be reached by far due to the short half-time of nicotine.

3.6. Varenicline

Varenicline as a partial agonist and partial antagonist of the nicotine receptor was introduced for tobacco cessation therapy ever since 2006 first in the USA and then stepwise worldwide. The substance was suspected to cause depression and suicidal thinking and irritability as a side effect. Eventually studies could show, but those effects appeared due to withdrawal symptoms and could not be attributed to varenicline. The substance has turned out to be the most effective and save support of smoking cessation in various studies [44–46]. Varenicline is applied as tablets to be taken twice daily. Due to nausea as a possible side effect dosage is started with 0.5 mg twice daily to be continued with 1 mg twice daily over 3 months. Varenicline is to be started about 1 week before the planned quit day. Abnormal dreams and disturbed sleep are the main reported side effects both disappearing after the end of the application [47]. While varenicline was suspected to cause psychiatric side effects like irritability, depression and suicidal tendencies in the past, recent studies could show those effects as withdrawal effects. Former possible contraindication in psychiatric/schizophrenic patients are not maintained [46].

3.7. Bupropione

Bupropione was originally developed as an antidepressant but showed effects in supporting smoking cessation therapy. Due to possible side effects (lowered seizure threshold) and lower effectivity compared to other substances (varenicline etc.), it has now a minor role rather restricted to patients with depression in smoking cessation but may be taken into consideration for patients with depression [48].

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4. Challenges to smoking cessation in COPD

4.1. Abstinence rates

Depending on the measures taken in tobacco cessation therapy, abstinence rates after 12 months can vary from about 3% over baseline after short advice to stop smoking up to nearly 50% following combined behavioural therapy and pharmacotherapy in an intensive setting [49–54].

4.2. Degree of addiction

COPD patients have higher dependence on tobacco [55, 56]. Higher dependence scores require not only a more intense behavioural therapy with more face-to-face contacts [38] and the possibility of individual psychotherapy if needed but also longer and more consequent application of pharmaceutical support. For example, the application duration of varenicline may be prolonged in patients with late relapse [57].

4.3. Role of depression

COPD patients have a higher depression rate [56, 58–63] COPD patients with depression require special treatment which takes specific depressed condition and consideration. In patients with a non-controlled depression, treatment of the depression is ranking before smoking cessation. Only after successful re-compensation of the psychiatric disease, the start of the cessation therapy should be undertaken [64–68].

4.4. Role of reimbursement

Reimbursement of tobacco cessation measures–regardless of the fact that a smoker who quits will save considerable sums of money and thus might pay for the cessation intervention–has shown to increase willingness to take part and to increase abstinence rates. It has to be accepted that addicted smokers have a different perception on spending considerable proportions of their income on tobacco products. Also, the major proportion of addicted smokers is a part of the less affluent and often has difficulties to pay for smoking cessation measures/medication at the given time when saving money with abstinence later [64, 65, 68].

4.5. Weight gain concerns

Minor weight gain after quitting average tobacco consumption is to be expected but can be avoided with higher physical activity [69–73]. Smoking one cigarette induces a loss of metabolic energy of about 10 kcal. Thus, a person who formerly smoked 20 cigarettes per day and who continues usual diet as before will have an increase of available energy of about 200 kcal per day after quitting. This results in a weight gain of about 5–7%. The person should be encouraged to accept this weight gain for a limited period of time until she/he will be a well-established secure ex-smoker with minimised relapse risk. It should be avoided to perform a weight control strategy while quitting as the success of the final abstinence, would be at risk with a double stress of smoking cessation and weight control efforts [70–72, 74].

4.6. Professional setting

The professional frame of tobacco cessation measures like behavioural therapy and pharmacotherapy counselling has a marked influence on long-time abstinence rates. Performing tobacco cessation therapy in physician practices as an integrated part of continuous therapy of their underlying disease appears to have a positive effect on long-time abstinence. This may be attributed to the fact that in the practice or outpatient ambulance, the patient will be seen after ending cessation therapy and continuously be monitored for maintaining abstinence, thus expecting specific questions from the physician who treats him. This may reduce relapse probability [54, 75, 76].

5. Role of e-cigarette

The e-cigarette is being introduced progressively as a possible instrument on the way to tobacco cessation and/or a measure of harm reduction respectively [77–79]. Increasing evidence appears to show that the e-cigarette may be helpful in smoking cessation particularly if containing a sufficient amount of nicotine which by itself does no harm to the respiratory system [78, 80].

Cell culture and experimental animal data indicate that e-cigs have the potential for inducing inflammation, albeit much less than smoking [81]. Evidence on possible hazards from e-cigarettes show increasingly clear that compared to tobacco cigarettes the risk of consumption of e-cigarettes is much less [82], while further research on the subject is on-going and necessary [83]. Recent research could show exposure to toxic and carcinogenic substances significantly lower in users of e-cigarettes as compared to cigarette smokers [77]. The FDA now has regulatory authority over e-cigs and can regulate product and e-liquid design features, such as nicotine content and delivery, voltage, e-liquid formulations and flavours. For patients who show no realistic willingness or ability of quitting and who in particular are not willing to apply nicotine replacement therapy products, the alternative of using E-cigarettes can be taken into consideration. Mainly two major potential risks of e-cigarette are being discussed at present. E-cigarettes might lead the consumer—mostly adolescents—into a tobacco cigarette consumer career, thus inducing possible lifelong addiction. E-cigarettes might contain compounds that might cause lung cancer although at a lower risk than tobacco cigarettes do. Both concerns hardly apply for COPD patients in far progressed stages of the disease where respiratory function by itself is acutely at risk. In particular for these COPD patients with highest degree of loss of lung function, the main goal must be to urgently avoid any further contact of toxic tobacco smoke with the bronchi. However, a great proportion of COPD patients in this situation due to their mental capacities and their addiction are not willing or able to avoid cigarette smoke by simply applying nicotine replacement as they will not be able to change their smoking habits which they feel can be preserved by using the e-cigarette. Thus, the goal of avoiding toxic smoke may be achieved by the application of e-cigarette vapour instead of tobacco smoke with high content of toxic and carcinogenic components. With more legal regulations on e-cigarette products worldwide and with a growing body of evidence on the toxic and carcinogenic potential, the role in smoking cessation/harm reduction will become clearer.

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6. Summary

Smoking is the major cause of COPD resulting in respiratory impairment and increased mortality. Smoking cessation is the single effective intervention to mitigate the development of COPD. Most smokers are addicted to cigarettes, thus lacking control of consumption and ability to quit. Standardised motivation strategies in use elevated rates of willingness for smokers to consider quitting. High abstinence rates can be achieved by combination of behavioural therapy and pharmaceutical support. Medications to support behavioural therapy are effective and safe. Reimbursement of smoking cessation measures increases willingness and abstinence rates, where smoking cessation is not a realistic option patient with end-stage COPD, may benefit from the use of e-cigarette.

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