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Spirometry and smoking cessation advice in general practice: A randomised clinical trial ☆

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Summary
Rationale: To assess the success rate of smoking cessation with the "minimal intervention strategy" in general practice, and to determine the influence of spirometry on this success rate.
Methods: Training in smoking cessation advice was given to 16 general practitioners (GPs). During 12 weeks, these GPs screened their practice population for smoking habits, the degree of dependence on nicotine, and the motivation to quit smoking. Patients willing to stop were randomised to a group that underwent a single office spirometry, or to a control group. The GPs were asked to support the attempts with the minimal intervention strategy. Success rates were compared after 6, 12 and 24 months.
Results: On a population of 5590 patients, 1206 smokers were identified (22%). To the vulnerable group, identified following the *Prochaska and Di Clemente* scheme, the proposal was made to change smoking behaviour. Two hundred and twenty-one patients undertook an attempt of smoking cessation. Nicotine replacement therapy (NRT) or bupropion was prescribed in 51% of the attempts. Sixty-four sustained quitters were counted after 6 months (29%), 43 after 1 year (19%) and 33 after 2 years (15%). We found a small but statistically non-significant difference in success rate in favour of the group that underwent office spirometry.
Conclusion: GPs can motivate almost 20% of their smoking population to quit smoking. The success rate with the minimal intervention strategy was 19% after 1 year and 15% after 2 years. We found no arguments in favour of confronting smokers with their lung function as a tool for enhancing smoking cessation.

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What this paper adds

Some authors state that spirometry could be a tool to enhance smoking cessation. Most of the papers about this topic compare ''regular'' smoking advice to ''intensive'' smoking advice, which often includes lung function testing. The present study isolates the influence of spirometry on stop smoking advice as a single variable. It showed a small, statistically non-significant difference.

Introduction

Smoking cessation is an important goal of most programs for public health.[1,2] Indeed, the burden of cigarette smoking is enormous.[2] One of the diseases strongly associated with the use of tobacco is COPD.[3] In general, the risk of COPD shows in general a good correlation with the intensity and duration of cigarette smoking.[4] By 2000 COPD has become the fourth leading cause of mortality worldwide.[5] Until now, smoking cessation is the only intervention that can delay the progression of COPD.[6]

The effectiveness of brief advice for smoking cessation is well established, but the estimated success rate differs greatly from one source to another.[7–9] All guidelines for smoking cessation include case finding and opportunistic advice in a primary care setting.[10–12] The performance of the involved health care professionals varies probably with a series of external influences. Assessment of the implementation of the guidelines can give hints for further improvement.

Office spirometry is to an ever-increasing extent available in general practice. The usefulness of this technique for lung health assessment and for screening airflow obstruction is documented.[13,14] Some authors state that spirometry may be a tool to enhance smoking cessation.[13,15] Confronting smokers with their abnormal lung function parameters should motivate them to quit. However, the literature about this topic is controversial.[16–18] A recent systematic literature review[19] addressed the question if spirometry can lead to increased smoking cessation rates. The authors found that six of the seven selected randomised controlled trials did not allow for an independent assessment of the effects of spirometry on smoking cessation rates. The only study that assessed the independent influence of spirometry[27] did not obtain spirometry directly in the primary care setting. The authors of the Agency for Healthcare Research and Quality report[19] concluded that more research is needed to determine if spirometry in primary care office-based settings results in improved rates of smoking cessation and long-term abstinence.

The aim of the present study was (1) to assess the implementation of the guidelines for smoking cessation in the Belgian primary care, and (2) to determine the influence of one single office spirometry on the success rate of smoking cessation in motivated persons.

Methods

Sixteen general practitioners (GPs), working at 14 different practices, followed a short training in giving advice to quit smoking. The Flemish guidelines[20] were used as a basis for this 4 h course. Training was given in the motivational interview and in the minimal intervention strategy (the 5A model: ask, advise, assess, assist, arrange). The motivational model of Prochaska and Di Clemente[21] was explained, as well as the Fagerstrom Nicotine Dependence Test[22] (FNDT).

Eight of the GPs had received training in performance and interpretation of spirometry before,[14] using a microspirometer. The eight others were using a spirometer, but had not received specific training.

The GPs were asked to screen all their attending patients above 15 years of age actively for smoking habits, their degree of dependence to tobacco (FNDT), and their motivation to quit smoking. During a 12-week period the GPs used the ''minimal intervention strategy'' to enhance smoking cessation among their smoking patients. The patients with a motivation in stage 3 (preparation) or 4 (action) in the scheme of Prochaska and Di Clemente were asked to fix a day to quit smoking, and a follow-up contact was offered. The GPs were instructed to prescribe nicotine replacement therapy (NRT) and/or bupropion for those patients willing to quit. In addition to this ''minimal intervention'', these patients were randomised into a group to perform office spirometry or to a control group. The randomisation method was tossing a coin. Doing so, a random sample of the potential quitters was confronted with their lung function measurement values and their flow/volume curve. The GPs were asked to note if these smokers had a normal lung function or airflow obstruction (defined as a $FEV_1/FVC < 0.7$). Six months after the stop date, the GPs informed by telephone if the attempt to quit smoking was still successful. This telephone round was repeated at 12 and 24 months after the stop date. Sustained

quitters after 2 years were invited to deliver a urine sample, which was examined for cotinine and creatinine as a control for the success of smoking cessation.

Results

Fifteen GPs provided us with registration results, after a case finding strategy on their total population of 5590 consecutive patients in a 12-week registration period for smoking habits. They found 1206 smokers (21.6%), 1026 ex smokers (18.4%) and 3358 never smokers (60%)(Table 1). This amount of smokers is smaller than in the general Belgian population, where 28.5% smokers are found.[23] Many more men than woman were active smokers. The gender difference was more important in the older age groups (Fig. 1).

Only in 34% of the current smokers and in 21% of the ex smokers the smoking habits were already filed in the medical records. The FNDT was performed among 751 smokers (62%). The average value was 4.4/10 (SD 2.3). The motivation for smoking cessation was assessed for 741 smokers (61.4%). For 187 smokers, the GPs found a stage 3 (preparation) or stage 4 (action) motivation to quit smoking, according to the scheme of Prochaska and Di Clemente. These 2 stages are appropriate for smoking cessation. Smokers with less than 10 pack/years of smoking history were less motivated for smoking cessation. We found no significant gender difference for motivation to stop.

The GPs managed to fix a date to try to quit smoking for 221 patients, or 18.3% of all smokers. Figure 2 shows the distribution of attempts by age; the largest amount of smokers trying to quit was found between 40 and 50 years of age. NRT and/or bupropion were prescribed for 51% of the candidates, for 12% it was not prescribed, and for 37% the data are missing. NRT and/or bupropion was more often prescribed for women (55.8% of the cases) than for men (47%), and more often for smokers with more than 10 pack/years (56.2%).

Table 1 Results of case finding on smoking behaviour in 15 GP practices.

	M	%	F	%	Tot
Smokers	658	28.6	548	16.7	1206
Ex smokers	687	29.8	339	10.3	1026
Never smokers	959	41.6	2399	73.0	3358
Totals	2304	100	3286	100	5590

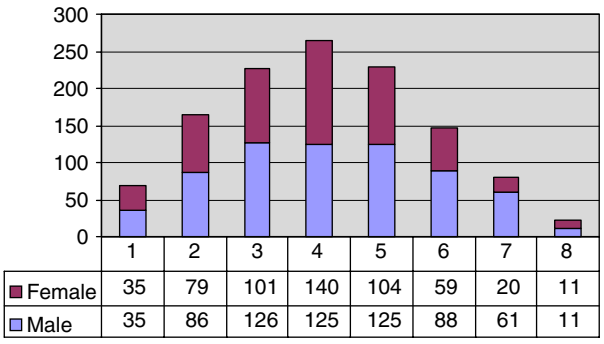

Figure 1 Active smokers by decade of age and by gender.

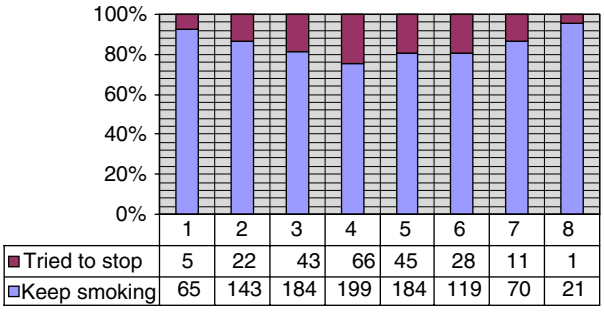

Figure 2 Stop smoking attempts in % and absolute number of total smokers, by decade of age.

Table 2 Success rates for smoking cessation in the practice population, based on a minimal intervention strategy.

In 1206 smokers	N	% of attempts	% of all smokers
Tried to quit	221	100	18.3
Success 6 M	64	28.9	5.3
Success 12 M	43	19.5	3.6
Success 24 M	33	14.9	2.7

Four registration centres failed to provide success rates after 6 months. By means of a telephone survey, we know that at least 64 subjects succeeded in smoking cessation after 6 months, 43 after 1 year, and 33 after 2 years (Table 2). Eight of the sustained quitters after 2 years (24.2%) underwent a cotinine test on urine. All of these revealed a negative result. On an intention-to-treat basis, this represents a success rate of 28.9% after 6 months, 19.5% after 12 months and 14.9% after 24 months. Data are missing for 29 attempts (13.1%) after 6 months, and for 35 subjects (15.8%) after 12 and 24 months.

Table 3 shows the influence of the different measured variables on the success rate for smoking

cessation. We found no statistical significant effect of the gender difference. Eighty-nine smokers were randomised to undergo a spirometry. Thirty-one (34.8%) of them succeeded in smoking cessation after 6 months, 20 (22.5%) after 1 year and 17 (19.1%) after 2 years. These success rates were at each moment higher than in the group without spirometry. However, the difference was never statistically significant. Within the group with known lung function tests, we found no significant difference in success rate between smokers with normal lung function versus smokers with airflow obstruction. The subjects receiving a prescription for NRT and/or bupropion showed at each moment better success rates than the group without pharmacological intervention. Only after 2 years, this difference revealed to be statistically significant ($P = 0.048$).

Discussion

This study shows that smoking cessation advice can be readily incorporated in the daily practice of the Belgian primary care. In a survey by E-mail among the participating physicians after the registration period, they stated to feel much more confident about their ability in smoking cessation advice than before. International guidelines advise to update the medical records in general practice with the smoking habits of every patient.[10–12] The results of our survey showed that this goal is not achieved in the Belgian primary care setting. The participants stated that the different systems for electronic medical record paid not enough attention to a clear, visible notation of smoking behaviour.

It is remarkable that nearly 20% of all identified smokers undertook an attempt to quit smoking. The number of attempts exceeded even the number of smokers presenting with the appropriate motivational stage, following Prochaska and Di Clemente. There is only limited evidence for the effectiveness of stage-based intervention in changing smoking behaviour.[24] The success rates of at least 29% after 6 months, 19% after 1 year and 15% after 2 years in the present trial exceed those of many other studies.[7] In addition, in our study sample data are missing for 29–35 attempts, or 13–16%. These attempts were calculated as relapses.

Several authors state that the use of spirometry can probably enhance the success rate of smoking cessation.[13,15] This opinion is sustained by the study of Risser and Belcher[25] This author observed an important difference in success rate between a group that received immediate feedback about

Table 3 Long-term success rate for smoking cessation, in relation to gender, confrontation with lung function values, diagnosis of obstructive airway disease, and the use of nicotine replacement therapy.

	% Success		P-value
Gender	Male	Female	
6 M	28.6	37.9	0.312
12 M	22.7	22.1	0.994
24 M	16.5	17.9	0.924
Spirometry	Yes	No	
6 M	34.3	29.0	0.670
12 M	22.5	20.4	0.987
24 M	19.1	14.0	0.580
OAD?*	Obstr	Normal	
6 M	33.3	36.7	0.570
12 M	23.3	22.4	0.850
24 M	20.0	18.4	0.962
NRT/bupropion†	R/	NO R/	
6 M	37.4	29.8	0.119
12 M	27.3	17.9	0.073
24 M	22.2	11.9	0.048

*OAD = Obstructive Airway Disease.
†NRT = Nicotine Replacement Therapy.

the smoker's exhaled carbon monoxide values, spirometry results, and pulmonary symptoms on the one hand, and a group with only education on the other hand. The number of included smokers (90) was rather low. In contrast, Sippel et al.[26] found no improvement of the quitting rate with additional education with spirometry and carbon monoxide measurements. An other randomised trial of smoking cessation interventions by Segnan et al.[27] compared the minimal intervention to three other arms with repeated counselling, one of them combined with spirometry. No significantly different outcome was measured. A recent systematic review[19] conducted by the Agency for Healthcare Research and Quality of the US concluded that there is little evidence that spirometry would provide more than small improvements in smoking cessation. The present study confirms this conclusion, when spirometry is isolated as a single intervention. However, we did not look at the kind of messages that the practitioner delivered to the patient, while showing the results of the spirometry. It is not unreasonable to think that this communication can play a role in the success rate of smoking cessation.

The present study did not show different success rates of smoking cessation for smokers with airflow obstruction, as compared to smokers with normal lung function values. This could indicate that the message of having a normal lung function does not decrease the motivation to quit smoking. This seems to be an important conclusion for stop smoking clinics. However, there may be a lack of power due to the relatively small number of smokers with known lung function ($n = 80$). Several other studies show good arguments for increased numbers of sustained quitters among smokers with airflow limitation.[28,29] Moreover, the present study was not designed to assess the influence of airflow obstruction on smoking cessation.

The positive effect of prescription of NRT and/or bupropion on smoking cessation is well documented.[30,31] The present trial can support this statement, although it was not designed to study this item, and the population was not randomised for this variable. It is surprising that the positive effect of pharmacological support has become ever more important with the time elapsed after the moment of quitting.

The most striking findings of the present survey are, first, the ability of a "minimal intervention strategy" being applied systematically in primary care to help 18.3% of all smokers to undertake an attempt for smoking cessation, and second, the successful attempt of 15% of those smokers to quit during at least 2 years.

Future research in this field should probably focus on the messages that are delivered during the counselling and the feedback about the lung function parameters, and its perception by the smokers willing to quit.

Conclusions

We found no arguments in favour of the use of a single spirometry to enhance smoking cessation in a primary care setting. This confirms similar findings in others studies with spirometry as an isolated variable. Smoking cessation advice by means of the "minimal intervention strategy" reached a high success rate in the tested Belgian general practice. A short training in smoking cessation advice had a strong positive effect on the self-perceived ability of the physicians who give this advice in daily primary care. This study strengthens former findings that training primary care physicians in smoking cessation advice is highly cost effective.

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