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EFFICACY OF CONFRONTING SMOKERS WITH AIRFLOW LIMITATION FOR SMOKING CESSATION

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ABSTRACT

The objective of the present study was to test whether confronting smokers with previously undetected COPD increases the rate of smoking cessation.

296 smokers with no prior diagnosis of COPD were detected with mild to moderate airflow limitation by means of spirometry and randomly allocated to; confrontational counselling by a nurse with nortriptyline for smoking cessation (experimental group), regular counselling by a nurse with nortriptyline (control group 1), or "care as usual" for smoking cessation by the general practitioner (control group 2). Only the experimental group was confronted with their abnormal spirometry (mean FEV_1 post-bd.%pred.=80.5, mean FEV_1/FVC post-bd.=62.5).

There was no difference in cotinine validated prolonged abstinence rate between the experimental group (11.2%) and control group 1 (11.6%) from week 5 through 52 (OR=0.96, 95%CI=0.43,2.18). The abstinence rate was about twice as high in the experimental group compared to control group 2 (5.9%), but this difference was not statistically significant (OR=2.02, 95%CI=0.63,6.46).

This study did not provide evidence that the confrontational approach increases the long-term abstinence from smoking rate compared to an equally intensive treatment in which smokers were not confronted with spirometry. The high failure rates (≥88%) highlight the need for treating tobacco addiction as a chronic relapsing disorder.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease which is characterized by airflow limitation that is not fully reversible.[1] Spirometry is the gold standard for the diagnosis and assessment of the disease.[1] COPD is currently the fifth leading cause of death worldwide[2], and projections for 2020 indicate a further increase in global mortality, placing COPD in the third position of lethal diseases.[3] Cigarette smoking is by far the most important risk factor for COPD, and smoking cessation is the single most effective way to reduce the risk of developing COPD and to affect the outcome in patients at all stages of the disease.[4, 5]

Underdiagnosis of COPD is a worldwide problem.[6] Most patients present to their doctor for various other reasons but often have respiratory symptoms, and in those who do present with respiratory symptoms, COPD is not always suspected nor diagnosed.[7] Because of the irreversible and progressive nature of the disease, early intervention is important. However, the use of spirometry for early detection of airflow limitation and COPD is still an issue of debate.[8-10] The most important counterargument is that there is no convincing evidence that spirometry increases smoking cessation rates.[11-13]

Discussing abnormal test results with smokers has been suggested as a "teachable moment" that may increase motivation to quit smoking, but there is only weak evidence to support such an approach.[14] Various studies have been performed on the efficacy of spirometry as a motivational tool for smoking cessation but their results are inconclusive.[11, 12] Findings are often of limited validity because of one or more important biases such as unstandardized counselling intensity, incomparable or uncontrolled use of pharmacological aids for smoking cessation between experimental and control group, or different (or unclear) baseline levels of

lung function and motivation to quit smoking.[15] The most recent randomized trial clearly showed a positive effect; telling smokers their "lung age" (based on spirometry) increased the abstinence rate by 7.2% after 52 weeks.[16]

We hypothesised that early detection of COPD and confrontation with spirometry for smoking cessation may be effective if "confrontational counselling" is applied[17]. Confrontational counselling is a patient-centred approach which involves confronting smokers with the consequences of their addiction (previously undiagnosed COPD) and which uses specific communication skills to identify and challenge irrational beliefs about smoking. We conducted a randomized controlled trial to assess the efficacy of confrontational counselling in comparison with regular health education and promotion for smoking cessation delivered by specialized respiratory nurses in current smokers with previously undiagnosed mild to moderate airflow limitation, with regard to prolonged abstinence from smoking rates from week 5 through 52 after the target quit date. Secondary outcomes were abstinence rates at week 5 and from week 5 through 26.

METHODS

The trial was designed to assess the "net" effect of confronting smokers with spirometry by comparing medium intensity confrontational counselling delivered by a respiratory nurse combined with nortriptyline for smoking cessation (experimental group) with medium intensity health education and promotion delivered by a respiratory nurse combined with nortriptyline for smoking cessation (control group 1). The effect of both treatments were compared to low intensity "care as usual" for smoking cessation by the general practitioner (control group 2). A detailed description of the protocol has been published elsewhere.[18]

The trial was approved by the medical ethics committee of Maastricht University Medical Centre and registered at the Netherlands Trial Register (ISRCTN 64481813).

Recruitment and eligibility of participants

Current smokers aged 35 through 70 years who were interested in quitting were recruited from the general population (through advertisements in local newspapers, flyers, posters, and mailings to households) and from primary care practices (during consultations and through posters in the waiting room and personalized mailings) in Dutch- and Belgian-Limburg (the region surrounding Maastricht). The text from the advertisements, flyers and posters explained that Maastricht University performs a study on smoking cessation treatment in which individual behavioural support is combined with medication for smoking cessation. No information about the target condition we are looking for (airflow limitation) is given to participants during recruitment.

Eligibility was assessed during an initial telephone interview. Inclusion criteria were: smoking history of 10 or more pack years (= number of cigarettes smoked per day x number of years smoking / 20); being competent to read and speak Dutch; and reporting at least one of the respiratory symptoms cough, sputum production, or shortness of breath. Exclusion criteria were: evidence of a prior respiratory diagnosis, defined by an affirmative answer to the question "Do you have COPD, chronic bronchitis, asthma or asthmatic bronchitis?". Subjects were also excluded if they had undergone spirometry during the preceding 12 months. One or more contraindications for using the smoking cessation medication (nortriptyline) were also criteria for exclusion, among others the current use of anti-depressants.

After the initial telephone interview, the participant information sheet with the informed consent form and the baseline questionnaire were sent to eligible subjects, and a date was fixed for spirometry at Medical Centre Annadal (Maastricht). The participant information sheet did not include any information about early detection and confrontation with COPD or the differences in counselling between the experimental and control group 1. The design we used was adapted from Zelen's design[19, 20] which may be particularly useful when evaluating the full unbiased impact of screening interventions.[21]

Spirometry was performed according to American Thoracic Society / European Respiratory Society criteria[22, 23] using a Vitalograph® 2120 (Vitalograph Ltd, Buckingham, England). Final eligibility was determined if subjects had airflow limitation defined as post-bronchodilator (post-bd.) Forced Expiratory Volume in one second (FEV_1) / Forced Vital Capacity (FVC) <70% in combination with post-bd. $FEV_1 \geq 50\%$ of predicted value; i.e. mild or moderate airflow limitation, according to the international Global Initiative for Chronic Obstructive Lung Disease (GOLD) guideline[1]. The results of spirometry were not discussed at that moment. Subjects with severe airflow limitation (post-bd. $FEV_1 < 50\%$ of predicted value) were excluded from participation and advised to contact their GP or a lung physician for further evaluation. Subjects without airflow limitation (post-bd. $FEV_1/FVC > 70\%$) were also excluded. All excluded smokers were told that despite their normal lung function, they still were at risk of getting other smoking related diseases which are not measured by spirometry, such as cancer or cardiovascular disease. They were strongly advised to give up smoking. After the last follow-up measurement, all participants received a debriefing letter with detailed information about the study and their GPs were informed about the results from spirometry.

All eligible subjects were contacted by telephone a few days after baseline spirometry to be randomised into one of the three intervention groups. The database of the trial incorporated a randomization system of seven participants per block, allowing an unequal group allocation of 3 : 3 : 1; experimental group : control group 1 : control group 2 (seven participants per block)*.

Interventions

Participants from both the experimental group and control group 1 received medium intensity counselling delivered by a respiratory nurse combined with nortriptyline for smoking cessation. The common basis for the counselling in both groups was the so-called "L-MIS" protocol for the treatment of nicotine and tobacco addiction which had been implemented among all respiratory nurses in the Netherlands in previous years.[24] The number of counselling sessions (4), their duration (40 minutes) and scheduling (weeks 1, 2, 3, and 4) was standardized in both treatment groups (table 1). Participants' attendance with counselling was assessed by counting the number of counselling sessions attended and dividing this number by 4. Specific elements of "confrontational counselling"[17] were added to the L-MIS in the experimental group, which discriminated the treatment from that in control group 1 (table 1). This involved discussing the results from spirometry and the prognosis of COPD and challenging irrational beliefs about smoking.

Participants from the experimental group and control group 1 received an equal dosage of nortriptyline for smoking cessation. Through this, the pharmacological treatment component was standardized and the risk of co-interventions used by participants reduced. Nortriptyline

* Note that we started out the trial with an equal group allocation of 1 : 1 : 1 and than switched to 3 : 3 : 1. This explains why the number of participants from control group 2 is higher than one third of the other two groups.

is a tricyclic anti-depressant and was chosen because it has been shown to be a cheap and effective alternative for the anti-depressant bupropion.[25, 26] Participants started taking nortriptyline on the day of the first counselling session (day 1). From day 1 through day 3, participants took one pill of 25mg nortriptyline once a day (preferably after dinner). From day 4 through day 7, participants took 50mg a day (given as two pills of 25mg). From day 8 through the end of the treatment period (day 49), participants took 75mg a day (given as three pills of 25mg). The nurse monitored the correct use of the medication and the occurrence of side-effects. In case of unpleasant or severe side-effects, the dosage was reduced or the use of the medication was stopped.

To test whether the experimental intervention as a whole was more effective than primary care as usual, participants from control group 2 were referred to their own GP for smoking cessation treatment. They were asked to make an appointment with their GP within the next ten days. They were provided with a referral letter explaining to the GP that they were participating in a study on smoking cessation. This letter did not give any information about the results from spirometry and the fact that the participant had airflow limitation. The GP was asked to provide the care he/she usually provides to patients who want to quit smoking. In the Netherlands, primary care as usual for smoking cessation involves the use of a protocol for low intensity health education and promotion, the so-called "H-MIS"[27]. A semi-structured interview was used among participants from control group 2 during the first follow-up visit in order to assess whether participants had indeed consulted their GP and which treatment for smoking cessation the GP had delivered.

Outcome measures and sample size

The primary outcome measure was prolonged abstinence from smoking from week 5 to 52 after the target quit date. Prolonged abstinence was defined as urine cotinine validated (<50ng/mL[28]) abstinence from smoking at all three follow-up visits; week 5, 26, and 52. The calculation of the sample size was based on the identification of a difference in prolonged abstinence rates of 15%: 35% quitters in the experimental group versus 20% in control group 1. This resulted in 136 participants needed in both groups (α=0.05, ß=0.20).[29] We expected a larger difference between the experimental group (35%) and control group 2 (8%[27]) and therefore fewer participants were needed in control group 2 (N=32).

Participants completed a questionnaire at baseline and at each follow-up visit. The questionnaire included various smoking characteristics and the Fagerström Test for Nicotine Dependence (FTND)[30]. Respiratory health complaints were measured with the Clinical COPD Questionnaire[31, 32]. Health-related quality of life was measured with the Chronic Respiratory Questionnaire self-reported (CRQ)[33, 34].

Data analyses

Statistical differences in abstinence from smoking rates were analysed using simple logistic regression analyses to calculate odds ratios and 95% confidence intervals. As part of an ancillary analysis, we used multiple logistic regression models to adjust for baseline covariates that are known to be associated with the primary outcome (see for example: [35]); age, sex, level of education, number of previous quit attempts, anxiety (measured with the Hospital Anxiety and Depression Scale, HADS[36]), and nicotine addiction (measured with the FTND). Furthermore, we performed a subgroup analysis to compare the abstinence rates of smokers with mild versus moderate COPD. All randomized subjects were included in the intention-to-treat analyses, and subjects not showing up at the follow-up visit or with a

missing value on the measure of abstinence were regarded as smokers. The proportion of missing data on items from the questionnaire ranged between 0 – 7%. Missing data were not imputed for any analyses.

RESULTS

A total of 116 smokers with previously undetected COPD were randomly allocated to the experimental group, 112 to control group 1, and 68 to control group 2 (figure 1). After 52 weeks follow-up, the numbers of participants lost to follow-up (i.e. with no data on the primary outcome variable) were: 14 (12%) in the experimental group, 19 (17%) in control group 1, and 15 (22%) in control group 2. The baseline characteristics are shown in table 2. A total of 160 participants (54%) had mild COPD and 136 (46%) had moderate COPD according to the GOLD classification.

Treatment received

One participant from the experimental group and one participant from control group 1 dropped out before the start of the counselling because they already had stopped smoking. Among the remaining participants, attendance in the counselling sessions was 95% in the experimental group and 92% in control group 1 (no statistically significant difference). The proportion of participants reporting one or more side effects of using nortriptyline to the respiratory nurse was 82%, 84%, and 72% during the counselling sessions 2, 3, and 4 (no statistical significant difference between the groups). The mean number of side effects reported was lower in the experimental group (mean=1.4) than in control group 1 (mean=1.8; p=0.017). Among all participants reporting side effects, dry mouth was most frequently reported (39%), followed by fatigue (10%) and dizziness (10%).

Of the 68 participants from control group 2 who were referred to their GP for care as usual for smoking cessation, 46 (68%) actually consulted their GP, 4 (6%) did not, and no information was available of 18 participants (27%). Among the 46 participants who consulted their GP, the median number of consultations was 2 (maximum 5). The median duration of these consultations was 10 minutes (range from 5 to 45 minutes). Anti-depressants were prescribed for smoking cessation in 34 of the 46 participants; bupropion (N=15), nortriptyline (N=17), or amitriptyline (N=1). Nicotine replacement therapy was prescribed in 6 of the 46 participants.

Abstinence from smoking

The abstinence from smoking rates in the experimental group, control group 1, and control group 2 dropped from 51% (N=59/116), 39% (N=44/112), and 18% (N=12/68) at week 5 after the target quit date to 11% (N=13/116), 12% (13/112), and 6% (4/68) from week 5 through 52 (table 3, figure 2). The odds of being abstinent from smoking was 60% higher in

the experimental group than in control group 1 at week 5 (OR=1.60, 95%CI=0.95, 2.70) and 43% higher from week 5 through 26 (OR=1.43, 95%CI=0.79, 2.58). There was no difference in prolonged abstinence rates from week 5 through 52 (OR=0.96, 95%CI=0.43, 2.18; table 3). The corresponding odds ratios adjusted for baseline covariates were OR=2.01 (95%CI=1.1, 3.7) at week 5, OR=1.58 (95%CI=0.82, 3.03) from week 5 through 26, and OR=0.88 (95%CI=0.38, 2.03) from week 5 through 52. Compared to control group 2, the odds of being abstinent from smoking from week 5 through 52 was about twice as high in the experimental group and control group 1, but these differences were not statistically significant (table 3). However, both at week 5 (OR=4.83) and from week 5 through 26 (OR=3.24), the odds of abstinence from smoking was significantly higher in the experimental group compared to control group 2.

Across the total study group, differences in abstinence rates between smokers with mild versus smokers with moderate COPD were small and statistically not significant; at week 5 after the target quit date, 40% (N=64/160) of smokers with mild COPD were abstinent from smoking compared to 38% (N=51/136) of smokers with moderate COPD. The corresponding abstinence rates were 25% (N=40/160) versus 21% (N=29/136) from week 5 through 26, and 11% (17/160) versus 10% (13/136) from week 5 through 52. There were also no significant differences within each of the three treatment groups.

DISCUSSION

We conducted a randomized controlled trial in 296 smokers with previously undetected mild to moderate COPD to assess the efficacy of confronting smokers with the results of spirometry for smoking cessation. Although we observed a clinically relevant but statistically non-significant difference at week 5, the confrontational counselling approach did not increase the prolonged abstinence from smoking rate from week 5 through 52 compared to an equally intensive treatment in which participants were not confronted with spirometry. In both groups, the proportion of smokers that did not succeed to quit or relapsed into smoking were very high (about 88%).

The use of spirometry for early detection of COPD is an issue of debate, primarily because of a lack of convincing evidence that spirometry has an added positive effect on smoking cessation.[11-13] The results from previous studies[8, 11, 12] are inconclusive, but the most recent one[16] shows a clear positive effect. Parkes et al. evaluated the impact of telling smokers their estimated lung age after spirometry.[16] Contrary to our findings, statistically significantly more smokers from the intervention group than from the control group were abstinent from smoking after 52 weeks: 13.6% vs. 6.4%. The authors concluded that "telling smokers their lung age significantly improves the likelihood of them quitting smoking".

Why did Parkes et al. find an effect whereas we did not? We think this can be explained for a large part by the differences between the two studies in their recruitment strategy and resulting characteristics of the study samples. First of all, subjects from the study by Parkes et al. had a better lung function (mean FEV_1 % predicted = 90 and mean FEV_1/FVC = 75 compared to mean FEV_1 % predicted = 82 and mean FEV_1/FVC = 63 in our study) and about one third of those with abnormal lung function was already known with COPD whereas in our

study, smokers with a previous diagnosis of COPD were excluded. Thus, the two study samples are not comparable concerning their baseline risk of COPD, a factor that is likely to affect the treatment outcome. Furthermore, the recruitment strategy of Parkes et al. probably led to a selection of participants who were interested in their lung function and were therefore more susceptible to related health warnings. This is the same mechanism that may explain the results from a large observational study in smokers from Poland that showed that spirometry promoted cessation.[37] Also in this study, selection bias may have occurred towards a group of smokers that was more interested in their lung health with the result that discussing spirometry may had a greater impact on smoking cessation.[38] In our study, participants responded to announcements for receiving a smoking cessation intervention (no attention was drawn to lung function testing). They may therefore have been less susceptible to our health warnings. Another important point is that we controlled the smoking cessation interventions in the experimental group and control group 1 to assess the "net" effect of confronting smokers with COPD, whereas Parkes et al. did not standardise the smoking treatments smokers used following confrontation with spirometry. It may be that these smokers made more use of, and were more compliant with evidence-based treatments for smoking cessation. All these differences in recruitment strategies are very important when interpreting the results; using spirometry in average (and mostly healthy) smokers who are interested in their lung function may trigger an attempt to quit smoking (and increase the likelihood of quitting), but in smokers with COPD who are interesting in quitting, confrontation with the results from smoking does not seem to be effective. Another point to be mentioned when comparing the results of our study with those of Parkes et al. is the limitation of the latter study to use a point prevalence estimate as primary outcome; the rate of non-smokers at 52 weeks. We used three follow-up measurements to calculate prolonged abstinence from smoking rates from week 5 through week 52, as recommended by the Society for Research on Nicotine and Tobacco.[39]

Furthermore, the average age of the participants from our study was comparable with the participants from the study of Parkes et al., but our participants had a heavier smoking history: 44 pack-years compared to 31 pack-years in the study of Parkes et al. This indicates higher levels of nicotine and tobacco addiction which is associated with a lower likelihood of smoking cessation.

Taking a closer look at the results from our study, it appears as if our confrontational counselling approach did have a *short-term* effect on smoking cessation; the abstinence rate at 5 weeks after the target quit date was almost 12% higher in the experimental group compared to control group 1 (OR=1.60), which is a clinically relevant difference for a comparison of two equally intensive treatments. The p-value was only marginally significant (p=0.08), but would probably have reached a level below 0.05 when the sample size (and therefore the power) would have been bigger. After adjusting for baseline covariates, the odds ratio increased to OR=2.01 with a p-value of 0.023. These findings suggest that confrontation counselling was likely to have an effect until shortly after the completion of the counselling treatment but that this effect diminished during the follow-up period in which the participants did not receive any more counselling.

To the best of our knowledge, only two other trials studied the efficacy of antidepressants for smoking cessation in smokers with COPD. Tashkin et al. performed a randomized trial on the efficacy of bupropion for smoking cessation in 404 smokers with COPD.[40] The abstinence rate in the bupropion group after 26 weeks follow-up was 16% (compared to 9% in the placebo group). Wagena et al. performed a randomized trial on the efficacy of bupropion and nortriptyline for smoking cessation in 255 smokers of which 56% had COPD.[41] The abstinence rates after 26 weeks follow-up were 27% in the bupropion subgroup with COPD

and 21% in the nortriptyline subgroup with COPD (compared to 8% in the placebo group). The subgroup of smokers with COPD that received nortriptyline had a lower abstinence rate than the subgroup of smokers with normal lung function (32%), indicating a lower likelihood of quitting in smokers with airflow limitation. These results are comparable with the results from our study and underline the high relapse rates in smokers with COPD who try to quit smoking.

A major strength of the present study is that all factors which are known to be associated with abstinence from smoking were standardised in both the experimental group and control group 1: type of counsellor (respiratory nurse), type of counselling (face-to-face and by telephone), number and duration of counselling sessions, and type (nortriptyline) and dosage of smoking cessation medication. The baseline risk for COPD of all participants was the same; they all had previously undetected mild to moderate airflow limitation. Only participants from the experimental group were confronted with their disease, and therefore we are able to assess the "net" effect of confronting and counselling smokers with COPD. A potential limitation of this approach is that the intensity and the standardisation of the counselling and use of smoking cessation medication in the two groups may have diluted the specific effect of the information about lung damage. On the other hand, it may be that the cognitive change the intervention aimed at (challenging self-exempting beliefs about smoking and increasing risk perceptions in order to increase the desire to stop smoking) can only be achieved through intensive counselling and not through brief advice. This is what we initially hypothesized.[17]

A major limitation of this study is the small sample size. We included about 30 participants less into the experimental group and control group 1 than expected according to the sample

size calculation. Therefore, the results from this study are not conclusive. With regard to the comparison between the experimental group and control group 2, we found statistically significant differences in abstinence rates at week 5 and from week 5 through 26. However, we were not able to find a statistical significant difference in abstinence rates from week 5 through 52. The study was not sufficiently powered to detect the observed difference of 5%.

In conclusion, this study did not provide evidence that confronting smokers who are interested in quitting smoking with previously undetected COPD increases long-term smoking cessation rates. Confrontational counselling may have short-term effects, but these diminish during the first year after initial counselling treatment. The high failure rates dramatically emphasize the difficulty tobacco addicted smokers experience with quitting smoking and highlight the need for treating tobacco addiction as a chronic relapsing disorder and to match it with an appropriate and tailored amount of care. This is especially indicated in smokers with respiratory disease, who have a more urgent need to stop smoking. Future research should investigate whether repeated counselling sessions during a longer follow-up period can consolidate an initial short-term effect and therefore increase long-term smoking cessation rates.

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Table 1: Components of counselling in experimental group and control group 1

General components in both experimental group and control group
FC1 (day 1): 40 min. counselling by RN - assess and discuss smoking characteristics - assess and increase motivation to quit - discuss cons of smoking and pros of quitting - start use of nortriptyline FC2 (day 8): 40 min. counselling by RN - evaluate use nortriptyline - assess and increase self-efficacy to quit - prepare of the TQD - anticipate on barriers of quitting and withdrawal TQD: TC (day 14): 5 min. counselling by RN - evaluate the quit attempt - give advice about quitting and abstaining FC3 (day 15): 40 min. counselling by RN - evaluate quit attempt - evaluate use nortriptyline - give advice about relapse prevention FC4 (day 22): 40 min. counselling by RN - evaluate quit attempt - evaluate use nortriptyline - give advice about relapse prevention - end counselling
Additional components of confrontational counselling in the experimental group only
Incorporated in FC1+2 - discuss the results from spirometry - confront with the consequences of smoking: the diagnosis COPD - discuss the severity and prognosis of COPD and the benefits of quitting smoking by using the "Fletcher curve" and images of normal and smoker's lungs[42] Incorporated in FC3+4 - reflect on the smoker's thoughts, feelings, and beliefs about COPD - challenge irrational beliefs about smoking by raising the smoker's consciousness about these beliefs, testing their reality, and by exploring the relationship between beliefs and behaviour - use of a smoking cessation diary to monitor smoking behaviour and beliefs about smoking

FC=face-to-face counselling session; TC=telephone counselling session; TQD=target quit date; RN=respiratory nurse.

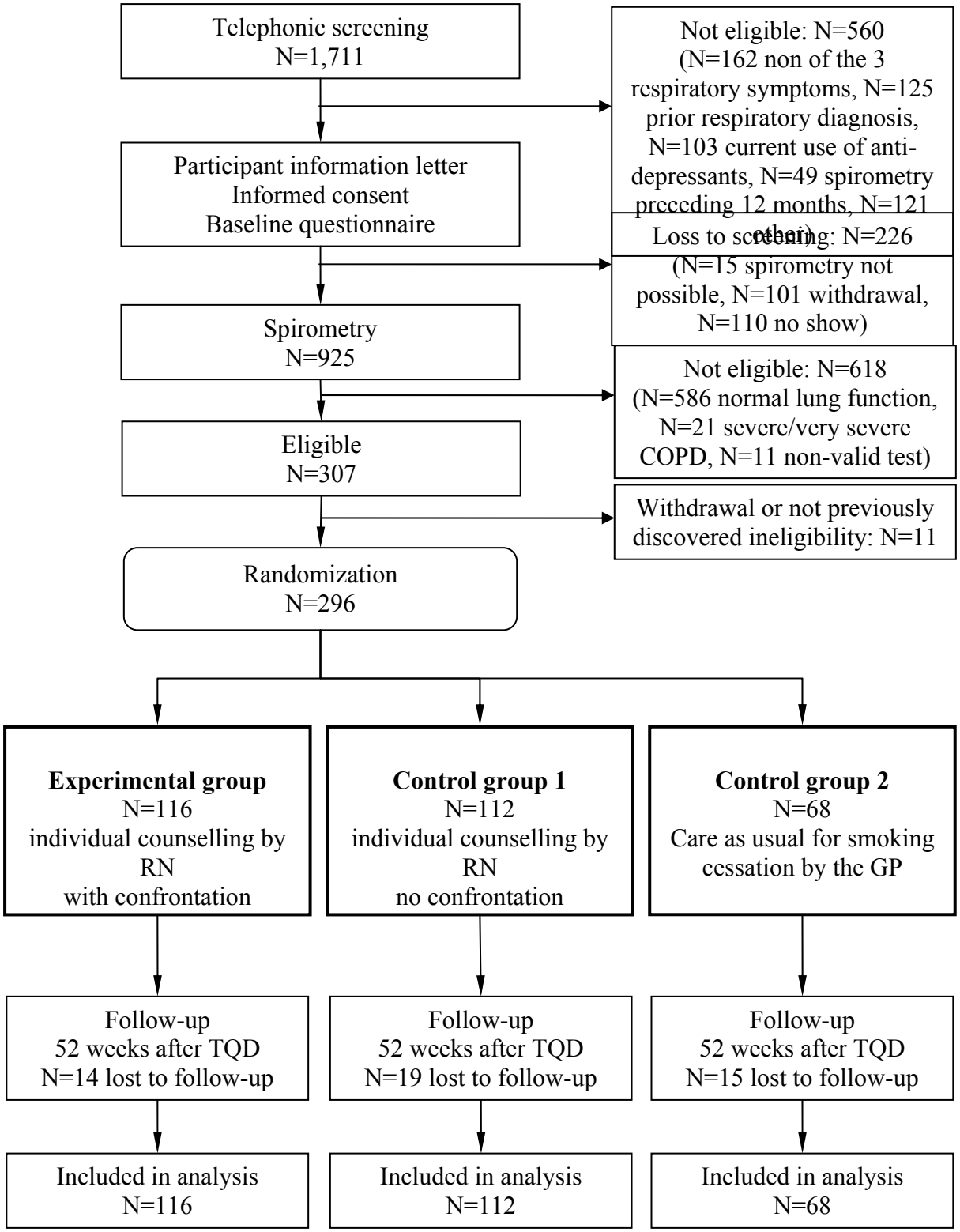


Figure 1: Study flowchart. TQD=target quit date; RN=respiratory nurse; GP=general practitioner.

Table 2: Baseline characteristics of participants

Characteristic	Experimental group (EX) N=116	Control group 1 (C1) N=112	Control group 2 (C2) N=68
Years of age	53.8 (7.0)	54.9 (8.0)	53.0 (7.6)
Male sex, N (%)	71 (61.2)	74 (66.1)	40 (58.8)
Level of educational background*	3.9 (1.7)	3.8 (1.8)	4.0 (1.9)
Body Mass Index, kg/m^2	25.0 (4.0)	25.3 (4.1)	24.8 (4.2)
Cigarettes per day	23.9 (8.4)	23.2 (9.9)	22.7 (9.6)
Pack years†	44.1 (18.3)	44.2 (19.1)	41.5 (19.7)
Nicotine dependence, FTND‡	4.6 (1.5)	4.5 (1.5)	4.4 (1.5)
Number of previous quit attempts	3.5 (3.5)	4.0 (5.7)	4.2 (3.3)
Previous use of pharmacotherapy for smoking cessation, N (%) nicotine gum nicotine patch bupropion	 30 (25.9) 60 (51.7) 23 (19.8)	 36 (32.1) 51 (45.5) 23 (20.5)	 30 (44.1) 35 (51.5) 18 (26.4)
Previous use of individual counselling for smoking cessation, N (%)	7 (6.0)	4 (3.6)	5 (7.3)
Clinical control of COPD, CCQ≠	1.3 (0.7)	1.3 (0.8)	1.2 (0.8)
Disease specific quality of life, CRQ-SR¥ fatigue emotional function mastery	 4.7 (1.1) 4.8 (1.1) 5.0 (0.8)	 4.7 (1.3) 4.8 (1.2) 5.0 (0.8)	 4.6 (1.4) 4.8 (1.1) 5.0 (0.8)
Anxiety, HADS#	5.6 (3.7)	6.0 (3.9)	5.9 (4.1)
FEV_1 post-bd. % pred.	80.5 (14.7)	83.7 (16.8)	79.7 (14.0)
FVC post-bd. % pred.	103.9 (14.9)	107.6 (17.8)	105.4 (14.4)
FEV_1/FVC post-bd.	62.5 (5.9)	63.0 (6.1)	61.9 (6.3)
GOLD classification¶ GOLD 1 (mild COPD) GOLD 2 (moderate COPD)	 62 (53.4) 54 (46.6)	 66 (58.9) 46 (41.1)	 32 (47.1) 36 (52.9)

Data are presented as mean (SD), unless otherwise stated. *Educational background: range from 1 (lowest education) through 7 (highest). †1 pack year = number of cigarettes smoked per day x number of years smoking / 20. ‡Fagerström Test for Nicotine Dependence: range from 0 (lowest level of nicotine dependence) through 10 (highest). ≠Clinical COPD Questionnaire: range from 0 (very good control of COPD) through 6 (very poor). ¥Chronic Respiratory Disease Questionnaire self-rated: range per sub domain from 1 (maximum impairment) through 7 (minimum).

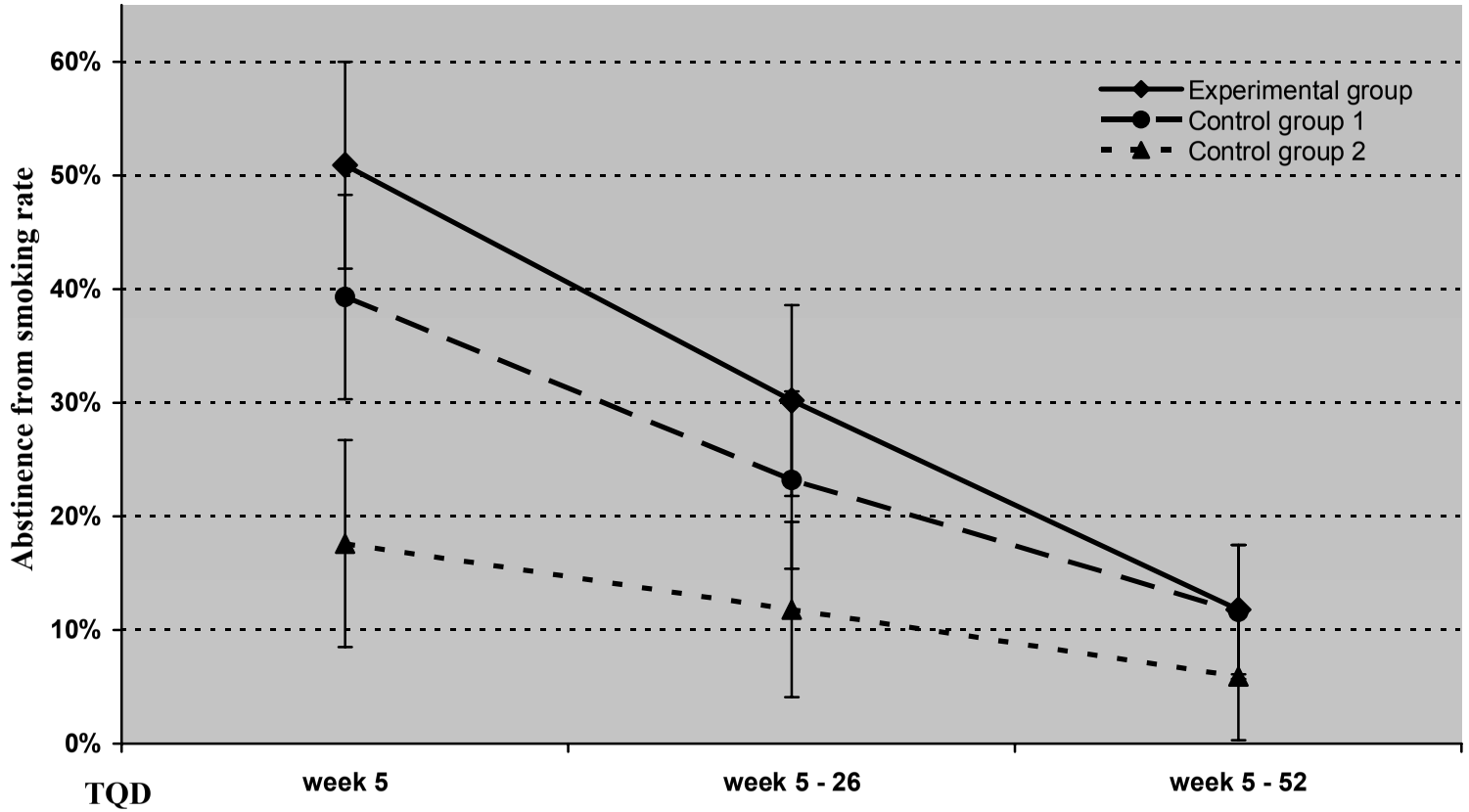
[#]Hospital Anxiety and Depression Scale: range from 0 (lowest degree of anxiety) through 21 (highest)]. [¶]Global Initiative for Chronic Obstructive Lung Disease.

Table 3: Cotinine validated abstinence from smoking rates

Weeks from target quit date	Experimental group (EX) N (%)	Control group 1 (C1) N (%)	Control group 2 (C2) N (%)	Odds Ratio for abstinence (95%CI)† p-value		
				EX vs. C1	EX vs. C2	C1 vs. C2
5	59 (50.9)	44 (39.3)	12 (17.6)	1.60 (0.95, 2.70) p=0.080	4.83 (2.35, 9.94) p<0.001	3.02 (1.46, 6.26) p=0.003
5 - 26	35 (30.2)	26 (23.2)	8 (11.8)	1.43 (0.79, 2.58) p=0.236	3.24 (1.40, 7.49) p=0.006	2.27 (0.96, 5.35) p=0.062
5 - 52	13 (11.2)	13 (11.6)	4 (5.9)	0.96 (0.43, 2.18) p=0.961	2.02 (0.63, 6.46) p=0.236	2.10 (0.66, 6.73) p=0.211

†Odds Ratios unadjusted for baseline covariates.

Figure 2: Cotinine validated abstinence from smoking rates during 52 weeks after the target quit date (TQD).



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