

Unaided Smoking Cessation in Healthy Employees

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Keywords

Self-quitters · Quit attempt · Workplace · Smoking cessation

Abstract

Background: According to guidelines, behavioral and pharmacological assistance should be offered to all smokers willing to quit. However, a large proportion of ex-cigarette smokers are self-quitters. **Objectives:** To identify characteristics of long-term, unaided self-quitters, as compared to re-current smokers among health care employees. **Methods:** University hospital employees ($n = 5,218$) were addressed through a 17-question questionnaire inquiring about past and current smoking behavior. Questions included daily cigarette consumption, pack-years, previous quit attempts, smoking-free period, and utilization of pharmacological therapies and counseling. **Results:** 2,574 (49.3%) questionnaires were returned. 791 subjects declared to have successfully quit smoking. A complete data set was available for 763 cases. Patients remained smoking free for a mean period of 11.8 ± 9.7 years. The most common smoking cessation method in these subjects was unaided (77.2%), followed by alternative approaches (15.4%), nicotine replacement therapy (4.5%), counseling (1.7%), and bupropion (1.2%). Smok-

ing cessation was achieved with 1 attempt in 53% of the cases, 2 in 19%, 3 in 13%, and more than 3 attempts in 15%, respectively. On average, 2.4 ± 3.02 attempts led to successful smoking cessation. After 2 or more unsuccessful attempts, the odds ratio for a further unsuccessful smoking cessation was 2.58 (95% CI 1.94–3.45). **Conclusion:** The majority of the ex-smokers quit smoking without any behavioral or pharmacological support. The chance to successfully quit smoking without any help in a first or second attempt is considerably high. The risk for smoking recurrence after 2 ineffective quit attempts is markedly increased (OR 2.58).

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Introduction

Smoking is the most important preventable cause of morbidity and premature mortality worldwide and reducing smoking prevalence is a priority for health care systems [1–3]. Smoking prevalence has decreased in most Western countries [4, 5]. Nevertheless, the risk of death from cigarette smoking continues to increase worldwide [6] and if the current trend of smoking in the world

continues, the global death toll will surpass 8 million by 2030 [7].

Cigarette smoking not only increases the risk of disease but also affects quality of life by exposing bystanders, particularly children, to the negative effects of passive smoking [8, 9]. Becoming abstinent has benefits to the health of smokers of all ages and smoking cessation at any age reduces the overall risk of death [10–12]. Although approximately 2 out of 3 smokers express the desire to quit [13, 14], most of them have a great deal of difficulty in doing so [1, 15]. Given the prevalence of smoking and the associated health consequences of continued smoking, it is critical to provide effective cessation interventions. Therefore, succeeding lifelong abstinence is an essential goal from the health perspective [16, 17].

According to guidelines, the effectiveness of smoking cessation is well established, and behavioral and pharmacological assistance should be offered to all smokers willing to quit [18–20]. Health care providers should routinely identify smokers and assist those trying to quit [21]. Getting help (e.g., through counseling or medication) can double or triple the chances for quitting [22]. However, we know little of the differences between users and non-users of cessation support. Several studies have examined a wide range of predictors in determining the outcome of smoking cessation efforts [23–26]. While intensity, frequency and duration of cigarette use along with concomitant nicotine dependence are likely strong determinants of successful cessation within cessation programs, little is known about determinants of successful smoking cessation among unaided, long-term self-quitters [27].

Identifying predictors of success in self-initiated smoking cessation is expected to help physicians and health professionals to become more efficient in advising and assisting smokers to quit and may lead to more effective use of health care resources.

The aim of this study was to identify characteristics of long-term, unaided self-quitters as compared to recurrent or persistent smokers among health care employees.

Methods

This was a prospective, cross-sectional, monocentric study including employees of the University Hospital Basel, Switzerland and was conducted between May 2005 and January 2012. The primary aim of our study was to identify characteristics of long-term, unaided self-quitters, as compared to recurrent smokers among health care employees. A predefined secondary endpoint was the identification of variables associated with a higher need for aid in smoking cessation. Data were handled strictly confidentially by the research team of the Clinic of Pulmonary Medicine and Respira-

tory Cell Research. Therefore, neither the personnel department nor the direction of the Institution had access to the individual data related to the study. The scientific data analysis and publication was approved by the Institutional Review Board.

Study Design

All employees of the University Hospital Basel ($n = 5,218$, aged 17–68 years), one of the largest employers of the City of Basel, Switzerland, were informed per mail and during two open seminars about the intentions of the Clinic of Pulmonary Medicine and Respiratory Cell Research and State Health Care Department to assess smoking behavior and the willingness to quit envisioning the design and implementation of a voluntary, employer-funded, smoking cessation program. Thereafter, employees were addressed by a second letter containing a 17-question, structured questionnaire about their current and past smoking behavior. Questionnaires were identified by a unique code generated by the study team. Employees had to return the completed questionnaire by mail within 1 month. Based on the results of the questionnaires, employees who were interested in the smoking cessation program were invited to participate.

The questions included demographic factors, smoking status, smoking history, motivational factors to quit smoking, and difficulties in quitting. Specifically, volunteers were inquired about: (a) demographic characteristics (age and gender), (b) smoking status (never-smokers and ever-smokers, who were further divided into current smokers and ex-smokers), (c) smoking history (smoking attitude, daily cigarette consumption, and smoking interval in pack-years), (d) motivational variables (the set of potential predictors) to quit smoking (previous quitting attempts, stage of readiness to quit smoking, smoking-free period, and utilization of pharmacological and behavioral assistance), and (e) barriers for quitting smoking or difficulties in quitting.

Never-smokers were defined as those having consumed less than 100 cigarettes in their lifetime. Conversely, ever-smokers reported having smoked at least 100 cigarettes in their lifetime. Responders were considered current smokers if they reported having smoked at least 100 cigarettes in their lifetime and are currently smoking at least 1 cigarette daily, whereas ex-smokers denied current cigarette consumption. Tobacco consumption was assessed by the number of cigarettes smoked daily.

First, we evaluated the past motivational component by assessing whether the responder had made a quit attempt in the previous years. The quit attempt was defined by the smokers and the abstinence time from smoking during a quit attempt varied between patients according to their smoking habits. Subsequently, the degree of current motivation to quit was assessed by estimating the stage of readiness to quit smoking according to the answer to the question “Do you currently want or ever wanted to quit smoking?”: no (0), immediately planning to quit (1), planning to quit at a later time point (2), ever considered quitting but not currently (3). Intention to quit is typically seen as a consequence of motivation. We then analyzed the number of quit attempts for ever-smokers and the time elapsed from the last quit attempt for ever-smokers reporting relapse. This measure was derived by adding the number of days given in response to the question “How many days, weeks, or months ago did your most recent quit attempt end?”. In the group of ever-smokers reporting relapse, physical dependency was assessed by estimating the length of the longest smoking-free period within a cessation attempt in days, months, or years, respec-

Table 1. Baseline characteristics and smoking history of employees at the workplace

Characteristics / Demographics	Current smokers (n = 333)	Ex-smokers (n = 763)	Ever-smokers (n = 1,096)
Age, years	41.2±10	44.4±10	43.4±10.1
Gender			
Male	75 (22.5%)	227 (29.8%)	302 (27.6%)
Female	258 (77.5%)	536 (70.2%)	794 (72.4%)
Previous attempts in quitting			
Median [IQR]	1 [0–2]	2 [1–3]	1.5 [0–3]
No attempt (none)	87 (26.1%)		87 (8%)
1 attempt	67 (20.1%)	404 (53%)	471 (43%)
2 attempts or more	179 (53.8%)	359 (47%)	538 (49%)
Duration longest smoking-free period, years	1.29±2.8	11.8±9.7	12.6±9.6
Utilization of pharmacological therapies and counseling			
Unaided	180 (54%)	589 (77.2%)	769 (70.2%)
Counseling	20 (6%)	13 (1.7%)	33 (3%)
Nicotine replacement therapy	70 (21%)	34 (4.5%)	104 (9.5%)
Bupropion	10 (3%)	9 (1.2%)	19 (1.7%)
Alternative approaches ¹	53 (16%)	118 (15.4%)	171 (15.6%)

¹ Alternative approaches for current smokers: motivational literature 12 (3.6%), pregnancy 7 (2.1%), acupuncture 6 (1.8%), hypnosis 5 (1.5%), study participation 3 (0.9%), ear clips 2 (0.6%), sports 2 (0.6%), and autogenic training 1 (0.3%). Alternative approaches for ex-smokers: pregnancy 24 (3.1%), motivational literature 15 (1.9%), sports 11 (1.4%), acupuncture 7 (0.9%), hypnosis 5 (0.6%), autogenic training 4 (0.5%), study participation 4 (0.5%), and ear clips 3 (0.39%).

tively. For ex-smokers, we assessed the use of quit smoking medication in previous quit attempts and specific physician support within a smoking cessation concept at any time.

Barriers for quitting smoking were assessed based on the smokers' answer to the following statement: "What prevents you from undertaking a quit attempt?": nothing (0), I enjoy smoking (1), I have no reason to quit (2), I have too much stress (3), I am afraid of weight gain (4), I turn obnoxious without smoking (5), I fear withdrawal symptoms (6). We also included a measure of whether responders had made multiple attempts as an index of difficulty in quitting (made multiple attempts vs. made only 1 attempt). Finally, current quit motivation was assessed by inquiring the readiness to take part in a smoking cessation program.

Data Analysis

The baseline information of all subjects was described using descriptive statistics. We explored the association between each predictor variable separately and the outcome of making a quit attempt. Differences in dichotomous variables were evaluated using the χ^2 test of the Fischer exact test, as appropriate. Normally distributed parameters were analyzed using the Student *t* test for equality of means. All other continuously, not-normally distributed parameters were evaluated using the nonparametric Mann-Whitney U test or the Kruskal-Wallis test, as appropriate. All analyses were performed using the Statistical Package for Social Sciences (SPSS) for Window version 19. The statistical significance was set at a *p* value of <0.05. Results were expressed as mean (standard deviation) or median (interquartile range) unless otherwise stated.

Results

The demographic variables of the subjects included in the study are depicted in Table 1. From the 5,218 initially mailed questionnaires, a total of 2,574 (49.3%) questionnaires were completed and returned; thereunder, 57.4% (*n* = 1,478) were never-smokers and 42.6% (*n* = 1,096) were ever-smokers.

Ever-Smokers

1,096 individuals reported having smoked at least 100 cigarettes in their lifetime. They were further divided into current smokers and ex-smokers.

Current Smokers

About a third of the subjects (*n* = 333, 12.9%) reported currently smoking at least 1 cigarette daily and they were defined as current smokers. Current smokers reported having smoked for a mean period of 20.4 ± 9.6 years.

The average number of cigarettes smoked daily was 14 ± 0.5. The great majority of the current smokers (43%, *n* = 143) smoked 11–20 cigarettes per day. More than one-third (38.1%, *n* = 127) smoked less than 10 cigarettes daily, 52 (15.6%) smoked 21–30 cigarettes, 9 (2.7%) smoked

31–40 cigarettes, and only 2 (0.6%) smoked more than 41 cigarettes.

Nearly three-quarter of subjects (73.9%, $n = 246$) reported at least 1 previous quit attempt in their lifetime. A total of 20.1% ($n = 67$) had made 1 previous quit attempt, 17.7% ($n = 59$) 2 quit attempts, 16.3% ($n = 54$) 3 quit attempts, and 19.8% ($n = 66$) more than 3 quit attempts in their lifetime.

Among current smokers, one-third ($n = 110$, 33%) reported the last quit attempt within the last 12 months. However, the majority of current smokers ($n = 136$, 40.8%) reported that the last quit attempt took place more than 1 year but less than 5 years ago. The mean duration of the longest smoking-free period was 1.29 ± 2.8 years.

A total of 149 current smokers (44.7%) reported to be immediately planning to quit, 26.1% ($n = 87$) have ever considered quitting but are not currently planning to quit, and 15.3% ($n = 51$) are planning to quit at a later time point. In contrast, 13.8% ($n = 46$) reported no intention to quit at all.

The majority of current smokers (54%, $n = 180$) had never gotten any assistance on previous quit attempts. A total of 21% ($n = 70$) had nicotine replacement therapy and 16% ($n = 53$) used alternative methods. Specific physician support within a smoking cessation was used by only 6% ($n = 20$) of the current smokers and pharmacological medications by 3% ($n = 10$).

Reasons for persistent smoking were evaluated among current smokers. A little more than one-third (36.3%, $n = 121$) of the current smokers further enjoyed smoking. A total of 20.4% ($n = 68$) were afraid of weight gain, 10% ($n = 33$) were too much stressed for a quit attempt, 8.1% ($n = 27$) feared withdrawal symptoms, and 6.3% ($n = 21$) turned obnoxious without smoking. In contrast, 16.2% ($n = 54$) reported no specific barriers for a quit attempt and 2.7% ($n = 9$) had no current reason to quit.

Finally, 49.8% ($n = 166$) and 26.4% ($n = 88$) of the current smokers reported being currently ready and eventually ready for joining a smoking cessation program, respectively.

Ex-Smokers

Overall, 791 (30.7%) subjects reported to have successfully quit smoking. A complete data set was available for 763 cases (29.6%). Nearly three-quarters (70.2%) were female, with a mean age of 44.4 years (range 17–68). Subjects had been smoking free for a mean period of 11.8 ± 9.7 years.

Smoking cessation was achieved with 1 quit attempt in 53% ($n = 404$), 2 attempts in 19% (145), 3 in 13% (99), and

more than 3 attempts in 15% (115) of the ex-smokers. On average, 2.4 ± 3.02 attempts led to successful smoking cessation. After 2 or more unsuccessful attempts, the odds ratio for an unsuccessful smoking cessation was 2.58 (95% CI 1.94–3.45).

Interestingly, the majority of the ex-smokers (77.2%, $n = 589$) quit smoking without any behavioral or pharmacological support. About 15.4% ($n = 118$) made use of alternative approaches. Only 4.5% ($n = 34$) of the subjects succeeded to quit with nicotine replacement therapy, 1.7% ($n = 13$) benefited from specific physician support, and finally 1.2% ($n = 9$) made use of pharmacological therapy (bupropion).

Discussion

The present study provides 3 main findings: (1) the vast majority of the ex-smokers quit smoking without any behavioral and pharmacological support; (2) most unaided, successful long-term quitters required 2 attempts to quit smoking; accordingly, the chances to successfully quit smoking without any help in a first or second attempt are considerably high; and (3) the risk for smoking recurrence after 2 ineffective quit attempts is markedly increased (OR 2.58). Thus, subjects recurring smoking after 2 unaided attempts are potential candidates for an intensified smoking cessation program. To our knowledge, this is the largest study analyzing the pattern of unaided quitting among health care employees.

It is widely accepted that the process of stopping smoking involves a series of stages starting from thinking about stopping, then planning an attempt, to actually making the attempt. Such planning is widely thought to be important for success. However, previous studies have shown that almost half of smokers' most recent attempts to stop smoking did not involve any previous planning and unplanned quit attempts were more likely to be successful than planned ones [28]. Unaided smoking quitting is also related to the legal and social environment in which the smokers live. Countries with more developed tobacco control policies have higher quit ratios than countries with less developed tobacco control policies. All smokers, irrespectively of their level of education, benefit equally from the national tobacco control policies [29].

Our findings suggest that, remarkably, the large majority of ex-smokers quit smoking individually without formal treatment (self-quitters). The very low proportion of behavioral and medical assistance for quitting in our study is in line with other investigations [30]. The find-

ings confirm the results of previous studies evaluating different populations [26, 31–36], which underlined the underutilization of smoking cessation supports [37]. While some data suggest that attempts prompted by health professional advice were not more likely to succeed [38] or lead only to short-term success [39], previous research showed that the use of assistance is associated with a greater success rate in comparison to no treatment [22, 40]. Accordingly, anti-tobacco campaigns and the increased availability of multiple forms of quit aids is assumed to facilitate the use of assistance and successful quitting [22]. Remarkably, no campaign underlines the fact that most ex-smokers quit unaided. In fact, reviews and guidelines give unaided cessation little attention [40–42].

The literature on smoking cessation suggests that long-term success rates of self-quitters remain often low, i.e., about 90% of smoking cessation efforts fail within the first year despite cessation aids and support systems [27, 43], and the probability of long-term abstinence is nearly 95% for smokers who successfully quit smoking for 1 year or longer [27, 44]. Surprisingly, there is a paucity of longitudinal studies reporting relapse curves of unaided self-quitters [45]. Previous results indicate that smokers who quit smoking without help had the highest risk of relapse at 3 months [27]. In our study, most subjects recurring smoking describe a smoking-free period of 11.8 ± 9.7 years.

Several studies have shown that there were sociodemographic disparities in unaided quit attempts. In some studies, spontaneous quitters are suggested to have more years of education and higher incomes, to be more likely to have a partner, to have fewer smokers in their social network, and to have a smoking history indicative of a lower level of nicotine addiction [46–48]. These characteristics suggest that self-quitters face fewer barriers for cessation and may have more resources to support their efforts to achieve and maintain abstinence. Additionally, previous results found that women were more likely to use support [22, 49]; this was not confirmed in our study, which had a larger female population and a higher education status than in other studies. In contrast to our results, a cross-sectional study found that unaided quitting was, amongst other things, more likely to be associated with lower educational attainment and lower income [34]. Nevertheless, there is a large variety in smokers seeking for quit advice across countries [50]. Smokers in middle-income countries generally reported lower-level use of quitting smoking medications and health professional services, but not necessarily less interest in quitting [51].

In addition, the high percentage of unaided quit attempts observed in those countries could be due to barriers for the use of support to quit smoking, e.g., financial reasons [52].

Next, we identified that more than 50% of smokers have succeeded to quit on the first attempt. The chance to successfully quit smoking without any help in a first or second attempt is considerably high. In line with previous research [53], the results of our analysis demonstrate that the more numerous quit attempts smokers make, the likelier it is that they will not be able to succeed on their own and therefore, they would benefit from behavioral or pharmacological support. In contrast, some studies reported that several quit attempts are typically necessary before lifelong success can be achieved [54], and their data suggest that it takes 10–14 attempts before a smoker definitively stops smoking. Unfortunately, determining the true median number of attempts before one definitively stops is difficult as the self-reported number of previous attempts is often inaccurate and subjected to recall bias.

Our study suggests that the risk for relapse after 2 ineffective quit attempts is markedly increased (OR 2.58). Thus, the chance to quit smoking without any help after more than 2 previous ineffective quit attempts is low. This observation is in accordance with previous findings suggesting that persons who had made more quit attempts were most likely to use a cessation program [49], although the intention to quit increased with the number of previous quitting attempts (for 6+ attempts compared to none) [15]. Therefore, the use of professional cessation aids might be particularly relevant to specific groups, e.g., those with more than 2 quit attempts.

Our study has several limitations. The study population is employed in the health sector and thus exposed to peer pressure against smokers in the health sector. The majority of smokers in this population are using less than 20 cigarettes per day and have low dependence. Furthermore, measurements of smoking abstinence were based on self-reports, and thus not verified with biochemical validation. However, this is an inevitable limitation of self-report studies and previous studies have suggested that the difference between self-reported results and verified results is negligible [55]. The mean duration of smoking cessation was more than a decade and therefore, events prior to smoking cessation may be subjected to recall bias. Furthermore, the study design was prospective, cross-sectional, monocentric and questionnaire based. This, however, is of less importance in our study since the main goal was to identify characteristics of long-term, unaided self-

quitters, as compared to recurrent smokers among health care employees, rather than the use of an intervention per se. Another limitation of our study is that it was performed in the pre-varenicline era and the results may change in settings where varenicline is available for smoking cessation. We should also consider the fact that several societal factors, such as the compulsory inhibition of smoking in restaurants or in public places are different today as compared with 5 years ago, when the study was completed. Finally, our study included a relatively homogeneous group of healthy adult smokers who volunteered to participate in the study; thus, they may not be representative of all other subgroups of smokers. The strength of our study is the large number of unselected subjects.

The results of the current study may provide researchers and clinicians with information about which smokers may require additional strategies to engage them in smoking cessation treatment. Health professionals and clinical guidelines should highlight the positive information that the most successful method used by most ex-smokers is cessation without assistance, a fact that warrants more focus on and further research into this aspect of smoking cessation.

In summary, behavioral and medical therapies for smoking cessation are deemed effective and are supposed to be recommended to all patients who are attempting to quit smoking. However, in our population, the majority of the smokers quit smoking without any help despite wide access to health care providers. According to our data, assistance should be offered particularly to subjects who already performed two unsuccessful attempts to quit.

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