

Original Research

Impact of a Medical Diagnosis on Decision to Stop Smoking and Successful Smoking Cessation

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Abstract

Introduction: Smoking cessation counseling is a central part of the Medicare guidelines for lung cancer screening. With increasing age, many heavy smokers eventually stop smoking, however, factors influencing the decision to stop smoking are poorly understood. We postulated that declining health or physician-diagnosis of a medical condition may be associated with successful smoking cessation.

Methods: A total of 4448 current and former smokers in Phase 2 of the COPD Genetic Epidemiology (COPDGene[®]) study answered a question about reasons for stopping smoking. Participants were classified as *successful quitters* (n=3345), and *unsuccessful quitters* (n=1003). Reasons cited for quitting were grouped as: medical diagnoses, social factors, symptoms. Logistic modeling of factors associated with successful quitting were adjusted for age, gender, race, and education.

Results: The most common factors cited for a quit attempt by all respondents were medical diagnoses (48%), followed by social factors (47%), and respiratory symptoms (36%). *Successful quitters* were more likely to be older, male, and non-Hispanic White. An adjusted model found increased age, White race, education beyond high school, and male sex favored successful quitting while the cited medical diagnoses, social factors, and “other” reasons were associated with unsuccessful quitting. Fagerstrom Nicotine Dependence scores were ≥ 5 in 54% of the unsuccessful group compared to 45% for successful quitters ($p < 0.0001$) suggesting some increased nicotine dependence in the unsuccessful quitters.

Conclusions: Medical diagnosis was the most common factor cited for considering a quit attempt by both successful and unsuccessful quitters; however, successful quitting was influenced by demographic factors and potentially the severity of nicotine dependence.

Abbreviations: COPD Genetic Epidemiology study, COPDGene[®]; chronic obstructive pulmonary disease, COPD; computed tomography, CT; modified Medical Research Council Dyspnea Scale, mMRC; St George’s Respiratory Questionnaire, SGRQ; Medical Outcomes Study 36-Item Short Form Health Survey, SF-36; Global initiative for chronic Obstructive Lung Disease, GOLD; preserved ratio-impaired spirometry, PRISm; forced expiratory volume in 1 second, FEV₁; forced vital capacity, FVC; gastroesophageal reflux disease, GERD; coronary artery disease, CAD; physical health component score, PCS; mental health component score, MCS; square root of the wall area for an airway with an internal perimeter of 10 mm, Pi10

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Introduction

Chronic cigarette smoking is associated with numerous adverse health effects including lung disease, cancer, cardiovascular disease, and premature death.¹ Public health goals for current smokers emphasize smoking cessation to reduce these risks.² The prevalence of smoking has decreased over the past 50 years, however, approximately 16% of the population are current smokers³ and up to 48% of the population over age 50 is a current or former smoker.⁴ Efforts to enhance smoking cessation can include education about the general risks of smoking, behavioral modifications, nicotine replacement, and medications.^{5,6} A structured program for smoking cessation that is part of the clinical practice guidelines from the U.S. Public Health Service, the 5-As (Ask, Advise, Assess, Assist, and Arrange) has been in place since 2000.^{7,8} As part of the National Lung Screening Trial the effectiveness of the 5-A program was evaluated. Although the last 2 activities (assist and arrange) were found to be the activities associated most with successful quitting, they were less frequently employed by physicians.^{7,9} Interestingly, the identification of even a false positive lesion on lung cancer screening was also associated with increased smoking cessation.¹⁰ It is not clear how frequently physicians engage in specific advice around smoking cessation,¹¹ but multiple sources report increased success in smoking cessation when physician engagement is present.^{12,13}

With increasing age, many heavy smokers do eventually stop smoking, although some smokers

persist despite lung disease and significant disability.¹⁴ Debate in the general community about the impact of smoking on health persists, in spite of strong scientific evidence, in large part fostered by commercial interests of the tobacco industry. Smokers may also demonstrate denial of health risks until confronted by critical diagnoses such as cancer, heart disease, or lung disease.^{15,16} By carefully evaluating a patient for known smoking-related illnesses, physicians may be able to provide specific diagnoses to their smoking patients and convey the known association to smoking. Smokers who have 30 pack years of smoking and who may now be eligible for lung cancer screening are of particular interest, due to the requirements under Medicare funding that these individuals receive advice about smoking cessation. If a smoker completes lung cancer screening without being given a cancer diagnosis, they may take a false reassurance that there has been no impact of smoking on their personal health, which would actually interfere with the goal to enhance smoking cessation.¹⁷ However, there has been less research on the impact of specific medical diagnoses on smokers' decisions to stop smoking.

We postulated that the decision to make a quit attempt might be associated with the development of lung disease, cardiovascular disease, cancer, or other medical conditions. We studied current and former smokers in the COPD Genetic Epidemiology (COPDGene[®]) study who completed both a Phase 1 and Phase 2 study visit and reported on smoking status at both visits. We compared current and former smokers who reported the same status at both visits, as well as those who quit smoking or restarted smoking during the 5-year interval between Phase 1 and Phase 2 visits. Participants were asked about reasons for their decision to stop smoking.

Methods

Cohort

COPDGene is a cohort of 10,192 current and former smokers who were recruited for a study of genetic factors associated with chronic obstructive pulmonary disease (COPD) and subtypes of this complex and heterogeneous disease. The cohort was recruited between 2007 and 2011 at 21 clinical centers in the United States. The COPDGene study was approved by the institutional review board at

each center, and all participants provided written, informed consent. Enrollment details, inclusion and exclusion criteria, and data collection from the Phase 1 visit has been described previously.¹⁸ Information collected during Phase 1 included: baseline spirometry, computed tomography (CT) findings of emphysema, gas trapping, and airway disease, respiratory symptoms including modified Medical Research Council (mMRC) dyspnea score, chronic bronchitis, and severe respiratory exacerbations, comorbid diseases, use of respiratory medications, 6-minute walk distance, and demographics. The St George's Respiratory Questionnaire (SGRQ)¹⁹ and the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36)²⁰ were used to assess respiratory and overall health-related quality of life.

Phase 2 return visits at a 5-year interval were completed between 2013 and 2017 and included questions about change in smoking status during the 5-year interval between Phases 1 and 2, as well as a question to describe factors that were associated with the decision to stop smoking. Of the 5611 participants who were seen for a Phase 2 visit, 4448 participants responded to the aforementioned questions regarding their decision to stop smoking and serve as the subset of the cohort used for the analysis within this paper.

Smoking Status

Participants were classified as current smokers based on a positive response to the question from the American Thoracic Society Respiratory questionnaire: "Do you smoke cigarettes now (as of 1 month ago)?" Participants were enrolled in the Phase 1 COPDGene study based on at least a 10 pack-year smoking history; however, most participants had a 30 to 50 pack-year smoking history. During the Phase 2 visit, participants were asked about their current smoking and a comparison was made of smoking status change between Phase 1 and Phase 2. This resulted in 4 groups based on smoking status: *Current* smokers (i.e., current smoking reported in Phase 1 and Phase 2), *Former* smokers (i.e., no current smoking reported in either Phase 1 or Phase 2), *Current to Former* smokers (i.e., Current smoker in Phase 1 and no current smoking in Phase 2), *Former to Current* smokers (No current smoking reported in Phase 1 and current smoking reported in Phase 2).

Successful or Unsuccessful Quitters

Participants were grouped as successful quitters if they had not resumed smoking in Phase 2 and had reported no current smoking in Phase 1. In addition, current smokers from Phase 1 who had quit by Phase 2 were also grouped as successful quitters. Unsuccessful quitters were current smokers in both Phase 1 and 2, and those Phase 1 former smokers who reported current smoking in Phase 2. For both successful and unsuccessful quitters, we analyzed those who responded to the question "If you ever stopped smoking, what factor affected your decision to stop?"

Reasons to Stop Smoking

Prior to the Phase 2 visit for the COPDGene study, a team of investigators developed a list of possible reasons that might have been considered by smokers in deciding to stop smoking. Potential reasons were derived from clinical experience in counselling smokers and reviewed by a questionnaire design committee for the study. Similar questions had been reported previously.^{21,22} The specific questions about the reasons to stop smoking and possible responses are detailed in Table 1. Each participant was permitted to mark all the reasons that applied to their decision to stop. The questions were grouped for analysis into Medical Diagnoses - 6 items, Symptoms -3 items, Social Factors -3 items, Other (unspecified) Reason, or No Reason. Participants who marked more than 8 reasons were excluded from the analysis (Table 2.)

Fagerstrom Test for Nicotine Dependence

Participants were queried about nicotine dependence using the questions from the Fagerstrom Test for Nicotine Dependence.²³ Participants who scored greater than or equal to 5 (selected as midpoint of moderate nicotine dependence) were considered to have more potential nicotine addiction.

Analysis

Comparisons were made across the 4 groups of smokers using analysis of variance and student's *t*-test for continuous variables. For categorical variables, the groups were compared using Chi square and Fisher's Exact test. Logistic regression modeling was done with successful quitting versus unsuccessful quitting as the outcome. Covariates for the model

Table 1. Smoking Cessation Questions from Phase 2 of the COPDGene Study

If you ever stopped smoking, what factor affected your decision to stop?	“Yes” Responses
Medical Diagnoses	
1. My doctor told me I have COPD	862
2. My doctor told me I had a heart attack, another heart problem or a stroke	254
3. My doctor told me I have cancer	118
4. My doctor told me that I have another medical condition	309
5. My doctor told me smoking is bad for my health	1354
6. I decided to stop because I have COPD	769
Any Medical Category Response	2223
Symptoms	
1. As I get older, I am less able to walk and exercise than people who don't smoke	696
2. I decided to stop because I didn't like coughing and bringing up phlegm	953
3. I didn't like the experience of smoking	641
Any Symptom Category Response	1660
Social Factors	
1. A family member or significant other person wanted me to stop	1352
2. Smoking is harder because of social disapproval and limits on smoking in public	675
3. Smoking was too expensive	1161
Any Social Category Response	2146
Other	
1. I decided to stop for <i>no particular reason</i>	572
2. I decided to stop because of <i>another (unnamed) reason</i>	1926

Table 2. Number of Responses by Participant

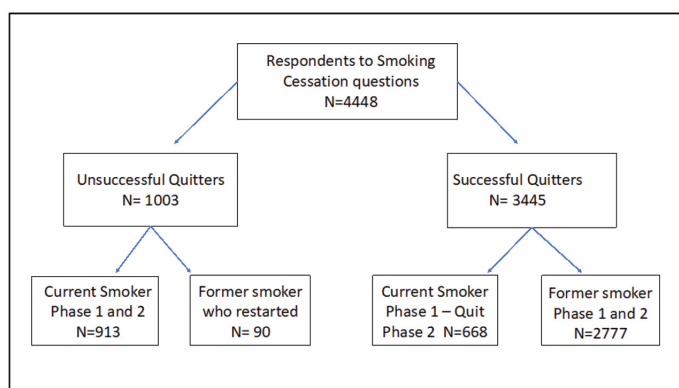
Number of Answers Marked	Participants with Response	Percentage of Total with Response Number	Cumulative Percentage
1	1736	40.24%	40.24%
2	920	21.33%	61.57%
3	605	14.02%	75.59%
4	398	9.23%	84.82%
5	246	5.70%	90.52%
6	187	4.33%	94.85%
7	113	2.62%	97.47%
8	54	1.25%	98.72%
9	21	0.49%	99.21%
10	14	0.32%	99.53%
11	9	0.21%	99.74%
12	2	0.05%	99.79%
13	2	0.05%	99.84%
14	7	0.16%	100.00%

Participants who marked more than 8 reasons for stopping were excluded from analysis. They represented approximately 1% of the response.

were selected to include basic demographics and education as a key variable likely to impact smoking decisions, along with the 5 categories of reasons to quit. Interaction terms for race and age and race and education were tested in the model and there was a significant interaction for race and education. Analyses were performed using JMP 13 and SAS (SAS Systems, Cary, North Carolina).

Results

There were 4448 participants who responded to the question about reasons for stopping smoking in Phase 2 of COPDGene. These participants were grouped into 4 categories: (1) *Current* smokers (n= 913); (2) *Current to Former* smokers (n= 668); (3) *Former* smokers (n= 2777); and (4) *Former to Current* smokers (n=90). In addition to the 913 participants in the *Current* smoker group, there were 1130 currently smoking participants who did not respond to the question, presumably because they have never stopped smoking (Figure 1). Comparing current smokers who responded to those who did

Figure 1. Description of Cohort

not, female participants were significantly more likely to respond than male participants (48% of female participants responded versus 41% of male participants), but otherwise the groups were similar in demographics of age and race. Characteristics of the 4 categories defined above are shown in Table 3. There were no significant differences between them in pack years of smoking, or the occurrence of severe respiratory exacerbations. *Current* and *Current to Former* smokers included a greater proportion of African American participants. The distribution of the 4448 participants by Phase 1 Global initiative for chronic Obstructive Lung Disease (GOLD) stage was: 2034 (46%) had normal spirometry, 402 (9%) were GOLD 1; 873 (20%) were GOLD 2; 496 (11%) were GOLD 3; 131 (3.0%) were GOLD 4 and 495 (11%) were preserved ratio-impaired spirometry (PRISm) (17 participants were not assigned a GOLD stage because of a failed spirometry).^{24,25}

Successful Quitters (Former smokers and Current to Former smokers) were significantly older and were more likely to be male. They had worse emphysema and gas trapping and had lower values for forced expiratory volume in 1 second (FEV₁) percentage predicted, forced vital capacity (FVC) percentage predicted and FEV₁/FVC. The *Former* smokers had a smaller mean segmental airway wall area percentage, Pi10, and airway wall thickness compared to *Current* smokers. The *Former* smoker group also had significantly more comorbid hypertension, gastroesophageal reflux (GERD) and coronary artery disease (CAD) with a mean of 3.6 comorbidities (versus 3.0 for *Current* smokers), and 67.5% of *Former* smokers reporting more than 2 comorbidities (versus 54.4% of *Current* smokers). However, *Former* smokers

had significantly better scores on the physical health component score (PCS) of the SF-36 and better overall scores on the SGRQ. All groups had significantly better mental health component scores (MCS) of the SF-36 when compared to *Current* smokers.

The list of 14 reasons for quitting were grouped into Medical Diagnoses, Symptoms, Social Factors, Other and No Reason for analysis as shown in Table 1. The number of responses for each reason to quit is shown in Table 1. Forty percent of the participants selected only 1 choice (Table 2). Of these participants, “Other reason” (unspecified) had the highest number of responses.

When considering all responses across all participants, 48% of respondents cited Medical Diagnoses as a reason to quit smoking (Table 4). Social Factors were the next most frequent in 47% of the participants, with “Other Reasons” in 42% and symptoms in 36% (Table 4). The effect of Medical Diagnoses was greatest among *Former to Current* smokers, with 63% reporting a medical diagnosis as a factor in considering quitting and was also strong in the *Current to Former* smoker group with 60%. The *Former* smoker group had the least frequent citation of Medical Diagnoses as a factor for quitting (41%) (Table 4).

There were 913 *Current* smoker participants who responded to the question of factors affecting the decision to stop smoking, indicating that they had unsuccessfully tried to stop in the past. There also were 90 former smokers in Phase 1 who reported returning to current smoking in Phase 2. These 2 groups together were considered to be *Unsuccessful quitters* (n=1003). Based on the smoking status at the time of the Phase 2 visit, we categorized participants as *Successful quitters* if they were either *Former* smokers in both Phase 1 and Phase 2, or they had stopped smoking between Phase 1 and 2 (n=3345). Characteristics of these 2 groups are shown in Table 5. The *Unsuccessful quitters* were generally younger, included a higher proportion of African Americans and were less likely to have COPD. The *Unsuccessful quitters* most strongly endorsed Medical Diagnoses as an important factor in deciding to quit or make a quit attempt.

The Fagerstrom Test for nicotine addiction was calculated for all current smokers in Phase 1 but had not been asked of former smokers. We compared the results of the Fagerstrom index among the participants

Table 3. Study Group Characteristics

	Unsuccessful Quitters (n=1003)		Successful Quitters (n=3445)	
	Current Smokers in Phase 1 and 2	Former Smoker to Current	Current Smoker Phase 1 to Former Smoker Phase 2	Former Smokers Phase 1 and 2
Number	913	90	668	2777
Age Phase 2	61.0 (7.0)	62.4 (7.7)	63.1 (7.3) ^a	69.6 (8.0) ^a
Gender (% male)	46%	44%	54%	50%
Race (% African American)	50%	29%	44%	11%
Pack Years	40.6 (21.9)	37.8 (19.4)	43.2 (23.4)	43.3 (24.9)
FEV₁ % Predicted Phase 2	80.1 (21.5)	82.3 (23.6)	75.1 (25.67) ^a	77.0 (26.3) ^a
FVC % Predicted Phase 2	88.8 (16.7)	91.0 (17.5)	85.2 (18.5) ^a	86.1 (18.4) ^a
FEV₁/FVC Phase 2	0.69 (0.13)	0.69 (0.14)	0.67 (0.16) ^a	0.66 (0.16) ^a
SF-36 PCS	42.7 (10.8)	43.7 (11.8)	42.0 (11.4)	44.2 (11.3) ^a
SF-36 MCS	49.0 (11.4)	52.3 (9.7) ^a	50.3 (11.6) ^a	53.9 (9.5) ^a
SGRQ Total Score	27.1 (21.6)	23.1 (20.7)	25.6 (22.3)	21.4 (20.6) ^a
6-Minute Walk Test	N=900 1296 (420)	N=86 1370 (418)	N=643 1237 (448) ^a	N=2629 1315 (444)
mMRC Dyspnea Score	1.3 (1.5)	1.2 (1.4)	1.4 (1.5)	1.2 (1.4) ^a
mMRC (% ≥2)	41%	38%	44%	38%
Chronic Bronchitis	23%	21%	11%	11%
Severe Exacerbations	11%	11%	13%	9%
Diabetes	19%	16%	19%	17%
CAD	11%	13%	13%	18%
Hypertension	50%	48%	49%	54%
GERD	24%	27%	27%	36%
Emphysema Percentage Phase 2	N=845 3.1 (5.8)	N=82 4.1 (7.5)	N=604 6.1 (9.9) ^a	N=2455 7.2 (10.4) ^a
Gas Trapping Percentage Phase 2	N=753 16.2 (16.0)	N=78 17.1 (19.0)	N=542 22.0 (19.8) ^a	N=2347 23.3 (19.8) ^a
Phase 2 Airway	N=845	N=82	N=606	N=2456
Wall Area %	51.8 (8.9)	51.7 (7.6)	50.0 (8.6) ^a	49.1 (7.7) ^a
Pi10	2.39 (0.59)	2.34 (0.58)	2.30 (0.58) ^a	2.20 (0.54) ^a
Airway Wall Thickness	1.07 (0.23)	1.06 (0.20)	1.03 (0.22) ^a	1.01 (0.21) ^a

^a<0.05 compared to current smokers

FEV₁=forced expiratory volume in 1 second; FVC=forced vital capacity; SF-36 PCS=Medical Outcomes Study 36-Item Short Form-physical health component score; SF-36 MCS=Medical Outcomes Study 36-Item Short Form-mental health component score; SGRQ=St George's Respiratory Questionnaire; mMRC=modified Medical Research Council; CAD=coronary artery disease; GERD=gastroesophageal reflux disease; Pi10=square root of the wall area for an airway with an internal perimeter of 10 mm estimated from a regression of measured airways.

who stopped smoking after Phase 1 (Successful quitters, n=621) to those who continued to smoke in Phase 2, but reported quit attempts (Unsuccessful quitters, n=867). The Unsuccessful quitters had significantly higher Fagerstrom scores at Phase 1 (4.7 versus 4.1, $p<0.0001$) than the Successful quitter group, and 54% of the Unsuccessful quitters had a score ≥ 5 compared to 45% of the Successful quitters.

The strongest predictor of successful quitting in the

logistic model was increasing age followed by male sex, non-Hispanic White race and higher education level. The impact of various categories of potential factors on the success of quitting was: reports of being influenced by Medical, No Particular Reason, and Social Factors were associated with less success in quitting. Other Unknown Reason and Social Factors were not significant. (Table 6)

Table 4. Reasons to Quit by Smoking Status Group

	Overall	Current Smokers	Former to Current Smokers	Current to Former Smokers	Former Smokers	Significance (ChiSq)
Number	4448	913	90	668	2777	
Medical Diagnoses	48%	60%	63%	60%	41%	<.0001
Symptoms	36%	39%	41%	42%	33%	<.0001
Social Factors	47%	49%	64%	50%	45%	0.0003
No Reason	12%	17%	14%	13%	11%	0.0003
Other Reason	42%	35%	30%	36%	46%	<.0001

Table 5. Characteristics of Successful and Unsuccessful Quitters

	Unsuccessful Quitters	Successful Quitters	p value
N	1003	3445	
Age	55.5 (7.1)	62.8 (8.3)	<0.0001
Gender (Male)	46%	50.6%	0.006
Race (African American)	48%	17%	<0.0001
Education – High School or Greater	86%	93%	0.0001
Pack Years Cigarette Smoking	43.5 (22.5)	43.6 (24.8)	0.8702
Diagnosis of COPD Based on Spirometry	42%	47%	<0.0001
Reasons to Quit	N=972	N=3287	
Medical Diagnoses	60%	45%	<0.0001
Symptoms	40%	35%	0.0103
Social Factors	50%	46%	0.0112
No Particular Reason	16%	11%	<0.0001
Other (unknown) Reason	35%	44%	<0.0001
Fagerstrom Score for Nicotine dependence ≥5	54%	45%	<0.0001

Table 6. Logistic Regression Model for Successful Quitting

	Direction of Effect	Odds Ratio	95% Confidence Interval	Significance
Age	↑	1.10 (unit odds/year)	1.09 – 1.11	<0.0001
Medical Diagnoses	↓	0.63	0.54 – 0.76	<0.0001
No Particular Reason	↓	0.59	0.47 – 0.75	<0.0001
Non-Hispanic White Race	↑	1.72	1.33 – 2.23	<0.0001
Race^a Education	Interaction			0.0012
High School Education or Better	↑	1.38	1.07 – 1.77	0.01
Male Gender	↑	1.20	1.02 – 1.40	0.02
Social Factors	↓	0.77	0.65 – 0.91	0.002
Other (unknown) Reason	Not Significant	1.16	1.02 – 1.42	0.08
Symptoms	Not Significant	1.07	0.90 – 1.26	0.46

^aAn interaction term between race and education that was significant in the model.

Discussion

The factors associated with smoking cessation in this analysis showed that medical events and medical risks are important in how smokers think about quitting, but do not provide a simple answer to the problem of

improving successful quitting. In a cohort of heavy, current and former smokers, the most common reason cited to quit smoking was medical diagnosis. However, this reason was cited by the unsuccessful quitters even more frequently than by the successful quitters. A wealth of studies has shown that smokers

want to quit but are strongly impacted by a variety of barriers including the addictive qualities of nicotine and smoking. A review by McCaul et al found a similar result over multiple studies of both current and former smokers – former smokers cite medical/health reasons most commonly but current smokers have even greater focus on health as a reason to quit.²⁶ An additional factor may be recall bias since the mean (standard deviation) time since quitting in the successful quitter group was 17.5 (11.9) years.

Determining factors that will motivate chronic smokers to quit successfully is critical to improving public health and reducing the impact of smoking on risk of several major diseases. Smoking cessation is associated with slower rates of decline in lung function and decreased risk of cardiovascular disease.^{27,28} The current national guidelines on smoking cessation emphasize the importance of going beyond simple advice to quit and providing assistance with classes, counseling, and pharmacotherapy.⁸ Several studies have shown that actually assisting the patient with these strategies are associated with increased quitting success.^{7,9}

We found significant differences between smokers who stop smoking and those who continue to smoke. Current smokers were often younger and were less likely to have encountered serious medical problems related to smoking. A physician diagnosis of a serious medical condition such as COPD, cancer, cardiovascular disease, or another problem was cited as an important factor to consider stopping smoking. Social factors including family wishes, social disapproval, and cost were also important. Surprisingly, symptoms such as cough and phlegm, or difficulty exercising were less influential in the decision to stop smoking, and this is corroborated by *Current* smokers who reported more chronic bronchitis and worse dyspnea symptoms compared to successful *Former* smokers.

The mean age difference between *Former* smokers and *Current* smokers in our cross-sectional study suggests that over time, many smokers will quit smoking. However, we also note that *Former* smokers tend to be stable in their smoking status. They appear to have made the decision to quit, often years ago and have been successful and largely stable. They report that medical diagnoses and social factors were both important in their decision to quit but have the highest proportion of “other” reasons. More recent quitters

(those who quit during the 5-year interval of this study, i.e., the *Current to Former* Group) appear to be intermediate between the *Current* and *Former* smoker groups with increasing evidence of lung disease based on spirometry and CT scans, and increased chronic bronchitis and less comorbid disease. They report a strong impact of medical diagnosis on their decision to quit and the time since quitting is much shorter than in the *Former* group. They are distinguished from the *Current* smoker group in part by their slightly lower nicotine addiction rates based on Fagerstrom scores.

Whereas the *Former* smoker group appears settled, the other groups who report multiple attempts to quit appear to oscillate between current smoking and cessation. These individuals report multiple quit attempts and in the subset who remained current smokers, they had higher Fagerstrom scores suggesting a somewhat greater addiction to nicotine. Although they reported a strong impact of medical diagnoses on their efforts to quit, they were not successful in quitting.

The results of this study suggest ways to improve smoking cessation. Physicians play an important role in informing smokers about medical diagnoses when they become apparent.⁵ As lung cancer screening with chest CT scans becomes a standard practice, physicians should consider whether patients should be informed about other smoking-related diseases such as emphysema that are identified on those scans. Knowledge of these conditions may represent a turning point for a smoker that could motivate them to succeed in smoking cessation.¹⁷

Assessment of nicotine addiction severity, as an adjunct to lung cancer screening and enhanced diagnostic screening, may also identify patients who could benefit from medication or more intensive counseling. Variation in nicotine addiction appears to play a role in how successful a motivated patient may be in achieving stable smoking cessation. The number of participants in the current study was too small to assess genetic factors in this regard, but earlier work has shown significant heritability in nicotine dependence²⁹ and a variant in the *CHRNA4* nicotinic acetylcholine receptor gene has been associated with nicotine dependence.³⁰

Strengths of this study include the large number of participants and broad inclusion of smokers with and without COPD. Participants were well characterized in

terms of severity of symptoms, function, quality of life, and CT findings. The goal of this paper was to explore specific reasons associated with smoking cessation. We selected questions based on 3 potential factors (medical diagnoses, symptoms, and social factors), but discovered that “other reasons” were equally important. Permitting multiple responses allowed participants to fully delineate the variety of factors contributing to the complex decision to quit smoking but did not allow us to determine the most important factor for each participant. Further study (including focus groups) could be used to define the specifics of “other reasons” and could be used to determine a hierarchy in influential factors. Limitations included the problem of recall bias and the fact that “other reasons” and “no particular reason” were frequently cited. These findings suggest that we have not captured aspects of how smoking cessation decisions are made and completed. A further limitation is that

the questions used were not derived from a validated instrument. Smoker status over time was ascertained from participant self-report and was not verified with cotinine levels or other confirmations.

Our study confirms the negative impact of chronic smoking on lung disease and identifies the potential importance of medical diagnoses to smokers considering smoking cessation. Integrating the diagnosis of other smoking-related medical diseases into lung cancer screening programs may improve smoking cessation rates and could also allow early treatment when available.

Declaration of Interest

KEH reports personal fees from AlphaNet, Inc., unrelated to the submitted work.

No other authors report potential conflicts of interest.

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