A comparison of smokers' and ex-smokers' health-related quality of life

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Abstract

Background The aim of the study was to assess the difference in health status between current smokers and ex-smokers of five years or greater standing.

Methods A group of current smokers and a group of ex-smokers (of five years or greater standing) in Aberdeen, north-east Scotland,were each sent a postal questionnaire containing SF-36, EuroQol, condition-specific and socio-demographic questions. The subjects were 3000 adults (1500 smokers, 1500 ex-smokers) randomly selected from the records of nine general practices. The main outcome measures were the eight scales within the SF-36 health profile, EuroQol tariff scores and assessment of respiratory symptoms.

Results Smoking cessation leads to an improvement in a range of respiratory symptoms and health-related quality of life. However, in some cases other socio-economic characteristics are better indications of quality of life than smoking status.

Conclusions Smoking cessation leads to a significant improvement in a range of respiratory symptoms. There appear to be significant differences between smokers' and ex-smokers' perceived quality of life. However, these differences are relatively small and in the majority of cases are better explained by variation in age, housing and economic status. When promoting smoking cessation to patients it is possible to highlight expected improvements in respiratory symptoms, impact on global quality of life and longer-term disease effects.

Keywords: Smoking cessation, quality of life, SF-36, EuroQol

Introduction

Cigarette smoking is believed to be 'the single most important contributor to ill-health in Scotland'.[1] Lyons et al. have previously demonstrated that the health status of those who had never smoked was significantly higher than those who had ever smoked.[2] They believed that the positive effects of smoking cessation on short- to medium-term general health would have a greater influence on smokers' decisions to quit than longer-term disease effects, such as lung cancer and heart disease avoided. It is also important to measure the changes in health status people experience after giving up smoking for purposes of evaluation.

The aim of this study was to ascertain any differences in health status between current smokers and ex-smokers of five years or greater standing. Studies have shown that, after five years of cessation, ex-smokers' heart disease rates are the same as those of non-smokers,[3–5] but elevated rates of lung cancer persist after 15 years of cessation.[6] It was expected that smoking cessation would lead to improvements in general health status and we assumed that these would be maximized after five years of cessation. As well as being used to aid an economic evaluation of smoking cessation programmes, assessments of quality of life provide information to assist health care workers who are explaining to clients the potential health improvements from smoking cessation.

Method

Between March and August 1995 a health status questionnaire was posted to smokers and ex-smokers registered with nine general medical practices in the City of Aberdeen, Scotland. The questionnaire was devised for self completion by patients and comprised: SF-36 (UK developmental version); EuroQol (two-page short questionnaire); nine condition-specific questions selected from the MRC Questionnaire on Respiratory Symptoms;[7] and a range of socio-economic questions. A sample size of 500 ex-smokers and 500 smokers was aimed for, as this was thought to be sufficient to detect a five-point difference in SF-36 scores with a power of 80 per cent and a probability of 95 per cent.[8] Information provided from one large urban general practice indicated that approximately one-third of all individuals classified as ex-smokers would have given up for a period of five years or more. To recruit 500 ex-smokers of five years or greater standing the health status questionnaire was sent to 1500 randomly selected ex-smokers. After three reminders had been sent out to this group a stratified random sample of current smokers was selected from general practitioner (GP) records

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Table 1 Age and sex distribution of respondents (with percentages given in parentheses)

| Age group | Smokers | | Ex-smokers | |
	Male	Female	Male	Female
20–29	7 (1.5)	8 (1.8)	6 (1.5)	12 (3.3)
30–39	24 (5.3)	50 (11.5)	31 (7.5)	52 (14.2)
40–49	60 (13.3)	78 (17.9)	59 (14.4)	66 (18.0)
50–59	128 (28.3)	115 (26.4)	102 (24.8)	83 (22.6)
60–69	150 (33.2)	113 (26.0)	124 (30.2)	84 (22.9)
70–79	75 (16.6)	64 (14.7)	76 (18.5)	63 (17.2)
80+	6 (1.3)	4 (0.9)	12 (2.9)	6 (1.6)
No response	2 (0.4)	3 (0.7)	1 (0.2)	1 (0.3)
Total	452 (100.0)	435 (100.0)	411 (100.0)	367 (100.0)

that matched the sample of ex-smokers of five years or greater standing by practice, age and sex.

Response rates and missing values in returned questionnaires were used to assess the ease of completion of the health status measures and the feasibility of using them to detect significant differences between groups of patients. Internal consistency was measured using Cronbach's alpha statistic for each of the SF-36 dimensions. In five of the SF-36 dimensions (PF, RP, BP, SF and RE) the highest possible score (100) is achieved when no limitations or disabilities are observed. Three of the SF-36 dimensions (GH, VT and MH) are 'bipolar' in nature: scores fall in the mid-range (50) when no limitations or disabilities are observed; a score of 100 indicates positive states and favourable evaluation of health.[8] EuroQol scores normally fall between zero (dead) and one (best possible health), but health states worse than death (negative scores) can be reported.

Differences in SF-36 and EuroQol scores for smokers and ex-smokers were initially compared using the *t*-test for the equality of means. Ordinary least-squares (OLS) regression analysis was performed to investigate the interrelationship between SF-36 and EuroQol scores, smoking behaviour and socio-economic characteristics. This was done using backward stepwise elimination, variables with an observed significance level above 0.10 being sequentially removed from the analysis. To determine any differences between smokers and ex-smokers, responses to questions relating to respiratory symptoms were compared using χ^2 tests of association.

Results

The initial questionnaire, which was sent to ex-smokers, had an overall response rate of 81.7 per cent (1225/1500). Valid responses from ex-smokers of five years or greater standing made up 63.5 per cent (778/1225) of the respondents. The second questionnaire, which was sent to current smokers matched by practice, age and sex to responding ex-smokers of five years or greater standing, achieved an overall response rate of 74.6 per cent (1114/1494) and a valid response rate of 59.4 per cent (887/1494). The valid responses from smokers and ex-smokers were well matched for age and sex (Table 1).

Table 2 Comparison of SF-36 and EuroQol scores

| Measure | Smokers | | Ex-smokers | | Difference in means (95% CI) | t-test for equality of means | |
	n	mean (SD)	n	mean (SD)		t value	p value
EuroQol Tariff	865	0.75 (0.25)	758	0.78 (0.23)	0.03 (0.011, 0.058)	2.89	0.004
SF-36 Physical Functioning	871	70.83 (28.35)	775	74.75 (26.39)	3.93 (1.267, 6.585)	2.90	0.004
SF-36 Role-Physical	851	67.49 (41.87)	754	72.01 (39.45)	4.52 (0.519, 8.516)	2.22	0.027
SF-36 Bodily Pain	884	67.53 (27.72)	778	70.63 (25.95)	3.10 (0.508, 5.698)	2.35	0.019
SF-36 General Health	852	60.81 (23.92)	757	66.12 (22.78)	5.32 (3.027, 7.611)	4.55	0.000
SF-36 Vitality	883	55.53 (22.01)	771	60.94 (20.47)	5.41 (3.348, 7.469)	5.15	0.000
SF-36 Social Functioning	886	78.76 (26.33)	778	83.13 (24.27)	4.36 (1.915, 6.810)	3.50	0.000
SF-36 Role-Emotional	830	72.33 (39.38)	745	77.11 (37.00)	4.77 (0.960, 8.588)	2.46	0.014
SF-36 Mental Health	884	69.41 (19.46)	771	74.56 (16.47)	5.13 (3.401, 6.907)	5.77	0.000

The internal consistency of the SF-36 dimensions was good: Cronbach's alpha coefficients ranged from 0.80 to 0.94, where values of alpha >0.5 have been reported as acceptable and values >0.8 as ideal.[9] Quality of life scores were approximately normally distributed. The t-tests showed that SF-36 and EuroQol scores for smokers were significantly lower than those for ex-smokers (Table 2). Regression analysis showed that after adjusting for socio-economic characteristics the relationship between lower health-related quality of life scores and smoking was maintained for the three SF-36 dimensions that were 'bipolar' in nature (see Method): general health, vitality, and mental health (Tables 3 and 4). These three dimensions also showed the largest and most significant differences using t-tests. Social functioning remained in the equation but was not significant at 5 per cent level. Increasing age and living in accommodation rented from the public sector were consistently associated with lower health-related quality of life, except for SF-36 mental health scores, which increased with age. Scores for vitality, role emotional, and mental health appear to be lower for women, whereas females seem to have higher general health scores. Car ownership was positively associated with all SF-36 scores but not the EuroQol tariff. SF-36 physical functioning scores and EuroQol increased with level of education.

With respect to the condition-specific measures, smokers were significantly more likely than ex-smokers to report cough, phlegm, shortness of breath on exertion, and wheeze. Smokers and ex-smokers were equally likely to report being woken with acute shortness of breath and to experience limited physical activity because of chest illness (Table 5). Logistic regression models showed that the association between respiratory symptoms and smoking status was maintained after controlling for age, sex and other possible explanatory variables. However, the logistic regression models had poor explanatory power and are not reported here.

Discussion

Smoking cessation is a key part of the strategy for meeting the disease reduction targets set out in Health of the nation[10] and Scotland's health.[1] The link between smoking and a large number of chronic diseases is beyond reasonable doubt, yet people continue to smoke for a combination of reasons including enjoyment, addiction and a lack of concern for health. Advertising bans and punitive taxation are effective means to reduce smoking, but they have not been deemed acceptable by policy makers in the United Kingdom. Instead, health promotion seeks to advise people of the potential dangers of smoking, encourage a sense of personal responsibility for health and support those engaged in cessation. Knowledge of differences in health status between smokers and ex-smokers is useful for two reasons: (1) to aid the economic evaluation of smoking cessation programmes, by providing a more direct measure of health outcome than cessation itself; (2) to provide information on health status improvement, which health care workers can use to encourage their clients to stop smoking.

Lyons et al.[2] suggested that measurement of the general health effects of smoking is more meaningful to the general public than long-term disease effects, and likely to have a greater impact on those who smoke. The data presented in this study suggest that smoking cessation will have the biggest tangible impact on the severity of respiratory symptoms. Although general health status is lower in smokers than ex-smokers, the concept of global quality of life can be somewhat abstract. Symptom improvement is probably more meaningful to patients than differences in SF-36 scores, and medical staff are seen as a credible source of advice on such matters. Further, it may be the case that smokers have a different perception of the quality of life available to them, as they may have adjusted their expectations of good health,

Table 3 Variable names, definitions and standard deviations

Name	Definition	Mean/proportion (s.d./mode)
smoking	0 = ex-smoker, 1 = smoker	0.53 (1)
age	age of patient in years	57.03 (12.83)
sex	0 = female, 1 = male	0.518 (1)
car	1 = household owns or has use of car/van, 0 = household does not have use of car/van	0.73 (1)
rented home	1 = home rented from public sector organization, 0 = home privately rented, owner occupied or parents	0.374 (0)
—	no qualification	base category
standard ed	1 = educated to O Level or standard grade, 0 = otherwise	0.208 (0)
higher ed	1 = educated to A Level or higher grade, 0 = otherwise	0.118 (0)
degree	1 = degree or professional qualification, 0 = otherwise	0.121 (0)
post-grad ed	1 = post-graduate qualification, 0 = otherwise	0.029 (0)
other	1 = other and vocational qualification, 0 = otherwise	0.064 (0)

Table 4 Relationship between HRQoL and socio-economic variables (OLS regression, reduced model)

Independent variable	SF-36 Dimension – coefficient (p-value)								EuroQol (p value)
	PF	PR	BP	GH	V	SF	RE	MH	
smoking	–	–	–	−3.032 (0.010)	−4.052 (0.000)	−2.208 (0.077)	–	−3.679 (0.000)	–
age	−0.688 (0.000)	−0.824 (0.000)	−0.345 (0.000)	−0.241 (0.000)	−0.090 (0.039)	−0.123 (0.013)	−0.270 (0.001)	0.153 (0.000)	−0.003 (0.000)
sex	–	–	–	3.759 (0.001)	−2.266 (0.036)	–	−4.770 (0.015)	−3.373 (0.000)	–
car	8.319 (0.000)	9.700 (0.000)	6.041 (0.000)	5.927 (0.000)	4.339 (0.001)	12.010 (0.000)	13.484 (0.000)	6.810 (0.000)	0.064 (0.064)
rented home	−5.276 (0.000)	−9.974 (0.000)	−6.639 (0.000)	−6.861 (0.000)	−5.112 (0.000)	−3.622 (0.009)	−5.015 (0.023)	−2.549 (0.013)	−0.051 (0.000)
standard ed	3.780 (0.022)	–	–	–	–	2.689 (0.074)	–	–	0.031 (0.043)
higher ed	5.860 (0.005)	–	–	3.480 (0.056)	–	–	–	–	0.041 (0.037)
degree ed	7.200 (0.001)	–	–	4.915 (0.007)	–	–	–	–	0.049 (0.013)
post-grad ed	12.351 (0.001)	–	–	–	–	–	–	–	0.072 (0.042)
other ed	−4.367 (0.093)	−9.974 (0.015)	−7.198 (0.008)	–	–	–	–	–	–
constant	122.293 (0.000)	133.402 (0.000)	99.372 (0.000)	82.260 (0.000)	76.291 (0.000)	105.501 (0.000)	89.388 (0.000)	79.656 (0.000)	1.008 (0.000)
Sample size	1532	1501	1545	1505	1540	1547	1471	1541	1518
Adjusted R^2	0.229	0.130	0.078	0.110	0.051	0.079	0.051	0.067	0.096
F (p value)	57.744 (0.000)	56.934 (0.000)	33.758 (0.000)	27.705 (0.000)	17.452 (0.000)	27.621 (0.000)	20.837 (0.000)	23.168 (0.000)	24.004 (0.000)

Table 5 Assessment of respiratory symptoms (with percentages given in parentheses)

Question	Smokers		Ex-smokers		Significance of difference	
	Yes	No	Yes	No	χ^2	p value
Do you usually cough first thing in the morning during winter? $n = 1654$	347 (39.4)	533 (60.6)	98 (12.7)	676 (87.3)	150.065	0.00
Do you usually cough during the day or at night in the winter? $n = 1639$	390 (44.9)	479 (55.1)	157 (20.4)	613 (79.6)	110.114	0.00
Do you cough on most days for as much as 3 months each year? $n = 1626$	267 (30.8)	599 (69.2)	94 (12.4)	666 (87.6)	79.884	0.00
Do you bring up phlegm from your chest on most days for as much as 3 months each year? $n = 1645$	260 (29.7)	614 (70.3)	107 (13.9)	664 (86.1)	59.525	0.00
In the last 3 years have you had a bad cough lasting for 3 weeks or more? $n = 1654$	255 (29.0)	625 (71.0)	174 (22.5)	600 (77.5)	9.048	0.00
Are you troubled by shortness of breath when hurrying on level ground or walking up a slight hill? $n = 1570$	407 (48.1)	439 (51.9)	296 (40.9)	428 (59.1)	8.235	0.04
Have you had attacks of wheezing or whistling in your chest at any time in the last 12 months? $n = 1574$	339 (39.9)	510 (60.1)	175 (24.1)	550 (75.9)	44.343	0.00
Have you at any time in the last 12 months been woken at night by an attack of shortness of breath? $n = 1574$	123 (14.6)	721 (85.4)	89 (12.2)	641 (87.8)	1.905	0.17
During the past 3 years have you had any chest illness which has kept you from your usual activities for as much as a week? $n = 1578$	228 (26.9)	620 (73.1)	166 (22.7)	564 (77.3)	3.601	0.06

which may distort general health measures. There are marked differences between smokers' and non-smokers' respiratory symptoms, but differences in overall quality of life are relatively small, and smoking status failed to be a significant predictor of EuroQol and five SF-36 scores. Smoking was negatively associated with the SF-36 dimensions that require a favourable assessment of health state for the highest scores to be achieved: general health, vitality and mental health. When promoting smoking cessation to patients the following factors may be highlighted: expected improvements in respiratory symptoms, impact on global quality of life and longer-term disease effects. A prospective study of smokers who were contemplating cessation would give better estimates of improvements in health status. However, such a study would be expensive and take a number of years to complete.

One aim of the study was to provide information for the economic evaluation of brief training to facilitate smoking behaviour change. Certain types of economic evaluation demand a single index of health outcome, which cannot reflect the multi-dimensional and dynamic nature of quality of life, but is suitable for priority setting. The SF-36 was not devised for use in economic evaluation,[11] as the dimension scores give no basis for establishing an overall benefit, but ways of deriving a single index from the different dimension scores are being considered. When combined with mortality data, EuroQol scores could be used directly to aid cost utility analysis of smoking cessation programmes, and thus make comparisons with other forms of interventions or health care programmes possible. It may be sufficient to use condition-specific measures and intermediate outcome measures, such as smoking cessation rates, when comparing different smoking cessation programmes. Generic measures, such as EuroQol and SF-36, are essential to compare smoking cessation programmes with other health care interventions. However, the association between different disease states and self-perceived quality of life is far from clear. Furthermore, apart from smoking status, other factors associated with ill health, such as housing, are clearly reflected in the regression results. Health care policy could reduce its emphasis on smoking behaviour and increasingly take wider influences on ill health into consideration. Further research, using a range of outcome measures, is still needed to gain a better insight into the health status improvements associated with smoking cessation.

Acknowledgements

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