

Original article

A new tool to assess and monitor the burden of chronic cough on quality of life: Chronic Cough Impact Questionnaire

Introduction: Chronic cough, one of the most frequent causes for a patient to consult a medical practitioner, limits the course of normal activities in everyday life of the patient affected (work, physical activities, social relations, night sleep). By now, there are few validated questionnaires for the evaluation of the impact of this symptom in the patient's quality of life (QoL). For this reason, we created a new questionnaire for the assessment of QoL in patients affected by chronic cough (Chronic Cough Impact Questionnaire, CCIQ).

Materials and methods: In the development procedure of CCIQ an initial questionnaire of 40 items was compiled and given to a first pool of 170 patients, each coming to our attention because of chronic cough; then the 25 most significant items were detected and converted into questions evaluating the answers on a Likert scale of five steps. Consequently, this final questionnaire underwent a validation procedure to assess its construct validity, internal consistency, reliability, and responsiveness. 95 patients (44.2% F, 55.8% M) were evaluated (age 53.69 ± 11.7 years).

Results: Following a statistical analysis, CCIQ showed a four-dimensional structure and good levels of internal consistency for the extracted factors: sleep/concentration (79.98), relationship (86.98), daily life impact (69.04), and mood (65.41). In stable conditions CCIQ showed a good reliability, ranged between 0.67 and 0.88. Responsiveness to clinical changes was accomplished.

Discussion: These results provide evidence that CCIQ has specificity enough for being a valid tool for detecting the relative burden of cough on subjective well-being, and for obtaining a global evaluation both of chronic cough impact and of treatments for it, taking into account the patient's point of view. The CCIQ was easily and quickly filled in by the patients while waiting, and it was accepted by the patients.

**I. Baiardini¹, F. Braido¹, O. Fassio²,
F. Tarantini¹, M. Pasquali¹,
F. Tarchino¹, A. Berlendis³,
G. W. Canonica¹**

¹Allergy and Respiratory Diseases, DIMI, Genoa University, Genoa; ²Dipartimento di Psicologia, Università di Torino, Torino; ³Divisione di Pneumologia, Spedali Civili, Brescia, Italy

Key words: chronic cough; health-related quality of life.

Prof. G. Walter Canonica MD
Allergy and Respiratory Diseases
DIMI
Pad. Maragliano
L.go R. Benzi 10
16132 Genoa
Italy

Accepted for publication 11 August 2004

Chronic cough, defined as cough lasting more than 3 weeks, constitutes a relevant problem in terms of utilization of the health care system and of cost to society (1–3). In addition, because of its characteristics, it results into a troublesome and distressing symptom with a substantial influence on patients' daily life and well-being. Clinical experience suggests that independently from its cause, chronic cough may interfere with physical status, emotional dimension and social interactions. Patients report that their symptom has a negative effect on sleep, physical activities, work and the capacity to function in daily roles. Chronic cough produces anxiety, worry, and emotional distress, while it undermines the patients' well-being and satisfaction. The impact may also extended to the partner, family and friends. Despite health-related quality of life (HRQL) (4) is now accepted as an important outcome in a patient centred approach, only a few studies focus the attention on this parameter in coughers (5–10).

In fact, the HRQL-specific questionnaires for respiratory diseases [asthma, chronic obstructive pulmonary disease (COPD), lung cancer, sarcoidosis, etc.] (11–20) include a limited percentage of items regarding cough-related problems, and only two instruments aimed at assessing HRQL in patients with chronic cough are now validated in the UK and the United States of America (7, 8).

The available tools, the Cough-specific Quality of Life Questionnaire (CQLQ) and the Leicester Cough Questionnaire (LCQ), have been developed and administered in English-speaking countries. At the moment there are not available validated versions of these questionnaires in other languages. Nevertheless, for both CQLQ and LCQ the process of translation and cross-cultural adaptation may be arduous: in fact these instruments include aspects related to the Anglo-Saxon reality and are not relevant in countries with a different cultural background (i.e. Southern Europe). For example, some activities that

represent a shared experience in the UK and the USA, such as 'singing in church', are not common in our context, so that the item appears irrelevant. Moreover, the use of questions that explicitly refer to cancer, acquired immune deficiency syndrome (AIDS), tuberculosis may be accepted with difficulty in some countries: for example, in our culture, the equivalence cancer = mortal disease is frequent.

In this study, our goal was to develop and assess the psychometric properties of a new HRQL tool, Chronic Cough Impact Questionnaire (CCIQ) specifically addressed to chronic cough, by using accepted methodological standard. The questionnaire was intended to be

- short and simple;
- self-administered;
- easy to score;
- useful to describe both the impact of chronic cough and interventions in clinical setting and research; and
- applicable also along with a disease-specific questionnaire (i.e. for asthma, COPD, etc.) as part of HRQL evaluation.

The strategy used for the construction of CCIQ is the same that has been applied in other HRQL questionnaires (15) and it consists of a development phase (item generation, item reduction and response options) and a validation phase that evaluates the psychometrics properties of the instrument (construct validity, internal consistency, reliability, and responsiveness) (21, 22).

Material and methods

The development and testing of the new tool required two separate procedures involving different groups of patients, as described in detail below.

Patients

All respondents recruited in the development and validation of the questionnaire were adult outpatients with chronic cough. Investigators, who were pulmonologists, enrolled patients afferent for chronic cough consultation to two different chronic cough centres.

Chronic cough was clinically diagnosed according to the ACCP guidelines (1).

Validation steps

Phase 1: CCIQ development procedure

Item generation. The first step was to collect potentially relevant and troublesome problems related to chronic cough.

First, an initial list of 40-items was compiled on the basis of the following sources: (i) literature review of the available HRQL-specific questionnaires for respiratory diseases or chronic cough; (ii) roundtables with experts and pulmonologists; (iii) unstructured interviews to 60 adult outpatients with chronic cough. This resultant list encompassed practical, emotional, social and physical aspects of daily life that could be influenced by chronic cough. Specific symptoms were also included in the initial list, in order to provide a systematic assessment of physical problems related to chronic cough.

Item reduction. The second step was comprised of an item importance ranking, in order to identify the most relevant problems related to chronic cough. The questions found during the item generation procedure, were randomly listed and administered to patients who were asked to indicate:

- which of the 40-items they experienced as consequence of chronic cough; the response options were yes/no; and
- how relevant each of the identified items was, by a 4-points response option, indicating the degree of importance related to each item (1 = not important, 4 = very important).

In this first phase, a sample of consecutive 170 outpatients with chronic cough was accrued during a 3-month period. On the basis of collected data we subsequently calculated:

- the percentage of patients who identified each item as a consequence of chronic cough (frequency range: 0–100);
- the mean importance attributed to each item (range: 0–4); and
- the overall impact of each item, calculated as the product of the frequency and the mean importance divided by 100 (range: 0–4).

Selected items were converted to questions where patients had to indicate how much they had been troubled by each problem during the last 2 weeks on a 5-point Likert scale (1 = not at all, 5 = very much) (22, 23).

This format of the questionnaire was administered to a different group of patients for the validation process.

Phase 2: CCIQ validation procedure. The validation process was performed in accordance with published guidelines, with the aim to evaluate the following properties of the instrument:

Construct validity. It is concerned with the extent to which a particular measure relates to other measures in a manner which is consistent with theoretically derived hypotheses concerning the concepts that are being measured. Factorial analysis was performed on CCIQ scores; the principal component method with Varimax rotation was adopted. By mean of Pearson correlation coefficients, we also evaluated the relationship between the new questionnaire and the SF-36, a generic instrument widely used in HRQL assessment of patients with pulmonary chronic diseases.

Because of the high specificity of the CCIQ, which investigates a specific component of different conditions, we would expect low correlations with the SF-36. In fact, our hypotheses is that the presence of chronic cough, independently from the cause and the diseases' severity, may specifically affect patient's well-being and that can be identified and quantified by an instrument focused on the symptom.

Internal consistency. It measures the homogeneity of a scale. It was estimated using Chronbach's correlation coefficient on the extracted factors. Measures with reliability of 0.50–0.70 or greater have been recommended for the purpose of comparing group.

Reliability. It refers to the ability of an instrument to provide the same results when used in patients whose clinical status on the dimension being examined is believed to be stationary. Reliability was assessed by administering CCIQ to 22 untreated stable patients at baseline and after 1 week (test–retest reliability). Data were analysed by *t*-test for paired samples.

Responsiveness. It measures the ability of the questionnaire to detect significant differences over time in patients whose status has changed. Responsiveness was assessed in a group of 25 asthmatic patients at baseline and after 15/21 days of treatment in accordance

with Global Initiatives for Asthma (GINA) guidelines. The CCIQ scores were compared by using a nonparametric test (Wilcoxon).

In this phase, 98 consecutive outpatients with a diagnosis of chronic cough, were asked to fill in the generated CCIQ and the generic questionnaire SF-36 (24, 25).

The SF-36 is one of the most widely used HRQL questionnaire in respiratory diseases (26–28). It is composed of 36-items corresponding to eight domains: physical function, role limitation – physical, bodily pain, general health, vitality, social function, role limitation – emotional, mental health. In addition, SF-36 provides two composite scores, physical (PCS) and mental (MCS) component summary that compute the physical and mental aggregate scores.

Patients did not require assistance to fill in the new questionnaire and were able to complete it in about 5 min.

The statistically significant cut-off value was set at $P < 0.05$.

The whole statistical analysis was conducted by using SPSS10.0.

Results

Phase 1: CCIQ development procedure

Of 170 patients, 166 completed the preliminary questionnaire. As reported in Table 1 the majority of patients were female; the mean age was 57.8 ± 11.7 with range of 23–79 years; 39.76% of sample were current smokers, 25.90% ex-smokers and 34.34% nonsmokers. The mean duration of cough was 25 months.

On the basis of patients' answers, items included in the questionnaire were those that scored highest in impact. Where an arbitrary cut-off value of 1.5 was used for impact, 15 items were excluded. Table 2 summarizes the result of this first phase, indicating the items removed because of the low total importance.

Phase 2: CCIQ validation procedure

Of 98 patients, 95 filled in both CCIQ and SF-36. The assessment of data missing from completed questionnaire was very small (1.13%). Table 3 summarizes sample's demographic and clinic characteristics.

Construct validity. Factor analysis revealed a four-dimensional structure, which explained up to 63.06% of the total variance. This solution was deemed appropriate on the basis of eigen values. Four items were excluded

because they were not allocated in the extracted dimensions (eating limitations, sexual activities, I feel embarrassed when I have cough in front of other people, cough disturbs me when I eat). In addition, symptoms included in CCIQ did not present the consistency of factor, in fact each of them is characteristic of a specific cause of cough. However, symptoms have been inserted in the final version of the questionnaire, in order to analyse the kind and entities of cough-related problems (such as dizziness, headache, hoarseness, etc.) and how each of them interferes with chronic cough-related QoL impairment. The final definitive validated version includes 21 question

Table 2. Results of the evaluation of the preliminary version of the questionnaire

Item	Frequency (%)	Mean importance	Overall Impact
Eating limitations	56.02	2.93	1.64
I feel isolated	22.28	1.16	0.26
I feel embarrassed when I cough in front of other people	74.70	3.05	2.27
Loss of appetite	30.72	2.15	0.66
I feel nervous	61.45	2.95	1.81
I have changed my habits	42.17	1.99	0.83
Work limitations	71.08	2.63	1.87
Loss of working days	39.75	1.94	0.77
Cough interferes with my social life	72.89	2.55	1.85
I feel helpless	23.49	1.87	0.44
Physical activity	78.31	2.84	2.22
Cough interferes with my going out	40.36	1.90	0.77
Cough disturbs me when I eat	65.06	2.44	1.58
Headache	72.28	2.61	1.89
Cough interferes with sport activities	22.89	2.54	0.58
I feel anxious about my health condition	65.66	3.12	2.05
Cough interferes with my sleep	68.67	2.98	2.05
Cough annoys my friends	66.86	2.56	1.71
I avoid going to concerts or the cinema	28.91	1.74	0.51
I wake up during the night	83.13	2.83	2.35
I cannot relax	32.53	1.38	0.45
Spare time	64.45	2.73	1.76
Dyspnoea	59.63	3.02	1.80
Cough annoys my partner	62.65	2.83	1.77
Heartburn	48.79	3.19	1.56
Difficulties in concentrating	59.63	2.90	1.73
I am worried that there is no effective treatment for cough	17.46	2.54	0.44
Sexual activities	57.22	2.68	1.53
Difficulties in falling asleep	63.25	2.44	1.54
I cannot participate in the activities I enjoy	44.57	2.18	0.97
Holidays plan	35.54	2.10	0.75
Hoarseness	72.89	2.31	1.68
Cough interferes with homework	39.15	1.89	0.74
I feel in a bad mood	62.65	2.90	1.81
I feel ill	36.74	2.14	0.79
Cough annoys my family	72.89	2.43	1.77
Chest pain	43.97	3.45	1.52
I feel tired during the day because of my bad nights sleep	63.89	2.61	1.67
I feel low in energy	42.16	1.15	0.48
Dizziness	29.51	3.80	1.12

Boldfaces indicates low important items (overall impact <1.5).

Table 1. Development phase: sample characteristics ($n = 166$)

	<i>n</i> (%)
Gender	
Male	73 (43.98)
Female	93 (56.02)
Age (years), mean (SD)	53.9 $\pm$ 8.7
Smoke	
Current smokers	66 (39.76)
Ex-smokers	43 (25.90)
Nonsmokers	57 (34.34)
Duration of cough, months mean (SD)	25 $\pm$ 9

Table 3. Validation phase: sample characteristics ($n = 95$)

	n (%)
Gender	
Male	42 (44)
Female	53 (56)
Age (years), mean (SD)	53.69 $\pm$ 11.7
Disease	
Asthma	32 (33.68)
GERD	27 (28.42)
PNDS	17 (17.89)
COPD	19 (20)
Smoke	
Current smokers	41 (43.16)
Ex-smokers	23 (24.21)
Nonsmokers	31 (32.63)
Duration of cough (months), mean (SD)	25.81 (31.71)

GERD, gastro-oesophageal reflux disease; PSDN, post nasal drip syndrome; COPD, chronic obstructive pulmonary disease.

regarding problems and symptoms (Appendix 1). Items belonging to each factor are listed in Table 4. As expected, the correlation between the CCIQ and the SF-36 were generally low (Table 5), with the exclusion of the factor 'daily life impact' that correlates with three SF-36 domains (physical functioning, pain, vitality) and with the Physical Component Score.

Internal consistency. Internal consistency reliability for the extracted factors exceeded the minimum reliability standard of 0.50–0.70 recommended for group comparison. In fact, Chronbach's alpha coefficient shows highly satisfactory levels of internal consistency for sleep/concentration (79.98) and relationship (86.98), and acceptable levels for daily life impact (69.04) and mood (65.41). No substantial damage was caused by removal of any items.

Table 4. Factors identified using principal components analysis on full data set ($n = 95$)

Item	Factors			
	1	2	3	4
Work	0.113	0.259	0.749	−0.006
Physical activities	0.009	0.276	0.524	0.153
Spare time	0.104	−0.003	0.765	0.172
Social life	0.129	−0.004	0.744	0.001
Night sleep	0.730	0.007	0.235	0.007
Do you have difficulties in falling asleep?	0.749	0.005	0.005	0.259
Do you wake up during the night?	0.851	0.148	0.007	0.005
Do you feel tired during the day because of your bad nights sleep?	0.762	0.003	0.009	0.009
Do you have difficulties in concentrating?	0.365	0.295	0.212	0.285
Do you feel nervous?	0.139	0.203	0.109	0.747
Do you feel in a bad mood?	0.233	−0.164	−0.108	0.796
Do you feel anxious about your health conditions?	0.006	0.202	0.217	0.683
Are you afraid of annoying your partner?	0.250	0.836	0.001	0.160
Are you afraid of annoying your family?	0.130	0.937	0.116	−0.001
Are you afraid of annoying your friends?	−0.006	0.808	0.157	0.106
Eigen values	4.404	2.058	1.626	1.370

Bold typeface shows the component upon which each item loaded most highly.

Table 5. Correlations between SF-36 domains and Chronic Cough Impact Questionnaire (CCIQ) factors

	Sleep/concentration	Impact on relationship	Impact on daily life	Mood
Physical functioning	0.072	−0.048	0.281*	−0.055
Role physical	0.122	0.067	0.134	−0.047
Bodily pain	0.141	0.036	0.367*	0.010
General health	0.157	0.191	0.183	0.041
Vitality	0.027	0.044	0.291*	0.061
Social functioning	−0.009	−0.002	−0.008	−0.220
Role emotional	0.103	0.117	0.067	−0.113
Mental health	0.124	0.151	0.094	−0.039
Physical component summary	0.147	0.029	0.333*	0.005
Mental component summary	0.074	0.129	0.026	−0.149

* $P < 0.01$.

Reliability. All items showed a good test–retest reliability. In fact, the Pearson coefficient ranged between 0.67 and 0.88, as shown in Table 6.

Responsiveness. Results of responsiveness to clinical change of CCIQ, are shown in Table 7. A statistically significant difference was recorded in 16- of 21-items, suggesting that the questionnaire is responsive to expected changes in severity of symptoms.

Table 6. Reliability of Chronic Cough Impact Questionnaire (CCIQ, $n = 25$)

Item	Pearson coefficient
Work	0.83
Physical activities	0.79
Spare time	0.81
Social life	0.77
Night sleep	0.84
Do you have difficulties in falling asleep?	0.82
Do you wake up during the night?	0.88
Do you feel tired during the day because of your bad nights sleep?	0.71
Do you have difficulties in concentrating?	0.87
Do you feel nervous?	0.73
Do you feel in a bad mood?	0.75
Do you feel anxious about your health conditions?	0.70
Are you afraid of annoying your partner?	0.88
Are you afraid of annoying your family?	0.84
Are you afraid of annoying your friends?	0.86
Symptoms	
Headache	0.79
Heartburn	0.74
Hoarseness	0.81
Dyspnoea	0.87
Chest pain	0.82
Dizziness	0.71

Table 7. Chronic Cough Impact Questionnaire (CCIQ) items with a significant difference after treatment

Item	P-value
Physical activities	0.01
Social life	0.007
Night sleep	0.001
Do you have difficulties in falling asleep?	0.005
Do you wake up during the night?	0.0001
Do you feel tired during the day because of your bad nights sleep?	0.008
Do you have difficulties in concentrating?	0.01
Do you feel nervous?	0.003
Do you feel in a bad mood?	0.001
Do you feel anxious about your health?	0.002
Are you afraid to annoy your partner?	0.004
Are you afraid to annoy your family?	0.02
Are you afraid to annoy your friends?	0.04
Symptoms	
Headache	0.02
Dyspnoea	0.01
Chest pain	0.03

Discussion

Chronic cough is one of the most frequent reasons for a doctor consultation and the costs associated to its diagnosis and treatment are high. Also it may be the most troublesome and annoying symptom in several chronic conditions (29). Moreover, in order to achieve a global description of this symptom, patients' reactions have to be considered, along with the traditional outcome measures.

The HRQL is coming to be accepted as one of the most relevant dimensions to be measured in the assessment of any therapy and health-related intervention. During the past two decades, the use of HRQL validated instruments has gained importance in both clinical research and disease management in respiratory diseases. The use of specific and generic questionnaires has made it possible to describe the burden of asthma, lung cancer, COPD on patients' well-being. Although chronic cough is a very common symptom, related to a multiplicity of disorders, few data are now available about its impact on patients' life. The CQLQ and the LCQ, two chronic cough-specific questionnaires, developed in an Anglo-Saxon context, are not validated in other languages. Besides the cross-cultural adaptation of these instruments may result in difficulties, due to some aspects culturally related. Moreover, in accordance to our hypotheses, during the development phase, several aspects are not encompassed in the CQLQ and LCQ raised (i.e. problems regarding the impact of chronic cough on sleep and concentration, preoccupation about the interference of this symptom with specific relationships) and are included in our questionnaire.

The purpose of our study was to develop and validate a questionnaire, specifically designed to assess HRQL in chronic coughers. The new tool was simple to administer, taking a few minutes to complete without any assistance. It was well accepted; patients seemed to be pleased that an attention in their QoL was a component of the initial assessment. The CCIQ can also be easily evaluated by means of software that obtains a score about the four-dimensions extracted and in addition reports the critical items (items in which patient reported the higher score).

Our questionnaire met the standards for validity with good construct validity, internal consistency, reliability and responsiveness. The low correlation with SF-36, an health-status measure, suggests that the CCIQ is able to identify how chronic cough, independently from its causes, interferes with patients' life.

Because of its specificity, the CCIQ can be used to complete the HRQL assessment in patients presenting chronic cough correlated to different diseases, with the aim to detect the relative burden of this symptom on subjective well-being.

The results of our study, based on accepted methodological standards, have provided evidence that CCIQ is a

valid tool to assess the impact of chronic cough on adult patients. In fact, the new questionnaire presents the properties required for a confident implementation in both research and clinical care.

Acknowledgments

This study has been partially supported by: ARMIA (Associazione Ricerca Malattie Immunologiche e Allergiche), Galen, Aventis, MIUR (unrestricted Educational Grant).

References

1. Irwin RS, Boulet LP, Cloutier MM, Fuller R, Gold PM, Hoffstein V et al. Managing cough as a defence mechanism and as a symptom: a consensus panel report of the American College of Chest Physicians. *Chest* 1998;**114**:133–181.
2. Fuller RW, Jackson DM. Physiology and treatment of cough. *Thorax* 1990;**45**:425–430.
3. Irwin RS, Madison JM. Diagnosis and treatment of cough. *N Engl J Med* 2000;**343**:1715–1721.
4. Schipper H, Clinch J, Olweny CLM. Quality of life studies: definitions and conceptual issues. In: Spilker B, editor. *Quality of life and pharmacoeconomics in clinical trials*. Philadelphia: Lippincott-Raven Press, 1990:11–23.
5. French CT, Irwin RS, Curley FJ, Krikorian CJ. Impact of chronic cough on quality of life. *Arch Intern Med* 1998;**158**:1657–1661.
6. French CT, Irwin RS, Fletcher KE, Adams TM. Evaluation of a cough-specific quality-of-life questionnaire. *Chest* 2002;**121**:1123–1131.
7. Irwin RS, French CT, Fletcher KE. Quality of life in coughers. *Pulm Pharmacol Ther* 2002;**15**:283–286.
8. Birring SS, Pudon B, Carr AJ, Morgan MDL, Pavord ID. Development of a symptom specific health status measure for patients with chronic cough: Leicester Cough Questionnaire (LCQ). *Thorax* 2003;**58**:339–343.
9. French CT, Fletcher KE, Irwin RS. Gender differences in health-related quality of life in patients complaining of chronic cough. *Chest* 2004;**125**:482–488.
10. Gerth van Wijk R. Quality of life, should we bother? *Allergy* 2003;**58**:284–286.
11. Juniper EF, Guyatt GH, Epstein RS, Ferrie PJ, Jaeschke R, Hiller TK. Evaluation of impairment of health-related quality of life in asthma: development of a questionnaire for use in clinical trials. *Thorax* 1992;**47**:76–83.
12. Hyland ME. The living with asthma questionnaire. *Respir Med* 1991;**85**:13–16.
13. Marks GB, Dunn SM, Woolcock AJ. A scale for the measurement of quality of life in adults with asthma. *J Clin Epidemiol* 1992;**45**:461–472.
14. Bayliss MS, Espindle DM, Buchner D, Blaiss MS, Ware JE. A new tool for monitoring asthma outcomes: the ITG asthma short form. *Qual Life Res* 2000;**9**:451–466.
15. Baiardini I, Pasquali M, Giardini A, Specchia C, Passalacqua G, Venturi S et al. Rhinasthma: a new specific QoL questionnaire for patients with rhinitis and asthma. *Allergy* 2003;**58**:289–294.
16. Jones PW, Quirk FH, Bavestock CM, Littlejohns P. A self-complete measure of health status for chronic airflow limitation. The St George's Respiratory Questionnaire. *Am Rev Respir Dis* 1992;**145**:1321–1327.
17. Maille AR, Koning CJ, Zwiderman AH, Willems LN, Dijkman JH, Kaptein AA. The development of the 'Quality-of-life for Respiratory Illness Questionnaire (QOL-RIQ)': a disease-specific quality-of-life questionnaire for patients with mild to moderate chronic non-specific lung disease. *Respir Med* 1997;**91**:297–309.
18. van der Molen T, Willemse BWM, Scokker S, ten Hacken NHT, Postma DS, Juniper EF. Development, validity and responsiveness of the clinical COPD questionnaire. *Health Qual Life Outcomes* 2003;**28**:1–13.
19. Bergman B, Aaronson NK, Ahmedzai S, Kaasa S, Sullivan M. Te EORTC QLQ-LC13: a modular supplement to the EORTC core quality of life questionnaire (QLQ-C30) for use in lung cancer clinical trials. *Euro J Cancer* 1999;**24**:17–24.
20. Cox CE, Donohue JF, Brown CD, Kataria YP, Judson MA. The Sarcoi-dosis Health Questionnaire. A new measure of health-related quality of life. *Am J Respir Crit Care Med* 2003;**168**:323–329.
21. Guyatt GH, Bombardier C, Tugwell PX. Measuring disease-specific quality of life in clinical trials. *Can Med Assoc J* 1986;**134**:889–895.
22. Guyatt GH, Kirshner B, Jaeschke R. Measuring health status: what are the necessary measurement properties? *J Clin Epidemiol* 1992;**45**:1341–1345.
23. Likert R. A technique for the measurement of attitudes. *Arch Psychol* 1932;**140**:5–55.
24. Ware JE, Snow KK, Kosinski M, Gandek B. SF-36 health survey. Manual and interpretation guide. Boston: The Health Institute, New England Medical Center, 1993.
25. Ware JE, Kosinski M, Keller SD. SF-36 physical and mental health summary scales: a user's manual. Health Assessment Lab, Boston: New England Medical Center, 1994.
26. Juniper EF, Thompson AK, Roberts JN. Can the standard gamble and rating scale be used to measure quality of life in rhinoconjunctivitis? Comparison with RQLQ and SF-36. *Allergy* 2003;**57**:201–206.
27. Bousquet J, Vignola M, Demoly P. Links between rhinitis and asthma. *Allergy* 2003;**58**:691–706.
28. van Manen JG, Bindels PJ, Dekker FW, Bottema BJ, van der Zee JS, Ijzermans CJ et al. The influence of COPD on health-related quality of life independent of the influence of comorbidity. *J Clin Epidemiol* 2003;**56**:1177–1184.
29. de Marco R, Bugiani M, Cazzoletti L, Carosso A, Accordini S, Buriani O et al. The control of asthma in Italy. A multi-centre descriptive study on young adults with doctor diagnosed current asthma. *Allergy* 2003;**58**:221–228.

Appendix 1. Chronic Cough Impact Questionnaire

The questions below are about areas in your life that might be affected by cough. For each question, check the answer that best describe how your activities, relationships and feelings are being affected by cough in the past 2 weeks (1 = not at all; 2 = a little; 3 = enough; 4 = much; 5 = very much)

In the past 2 weeks, has your cough interfered with the following activities?

Work

Physical activities

Spare time

Social life

Night sleep

In the past 2 weeks, how much have you been troubled by the following symptoms?

Headache

Heartburn

Hoarseness

Dyspnoea

Chest pain

Dizziness

With the following answers we want to investigate difficulties and problems that are cough-related (during the past 2 weeks)

Do you have difficulties in falling asleep?

Do you wake up during the night?

Do you feel tired during the day because of your bad night's sleep?

Do you have difficulties in concentrating?

Do you feel nervous?

Do you feel in a bad mood?

Do you feel anxious about your health?

Are you afraid of annoying your partner?

Are you afraid of annoying your family?

Are you afraid of annoying your friends?